WORKFORCE REQUIREMENTS OF MAJOR ALBERTA RESOURCE PROJECTS 1989 - 1997

RECENTLY CONSTRUCTED, UNDER CONSTRUCTION OR PROPOSED

November 1989

Alberta

CAREER DEVELOPMENT
AND EMPLOYMENT

Labour Market
Research Division

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HIGHLIGHTS

1. Major resource projects recently constructed, currently under construction or proposed for Alberta during the 1989 to 1997 time period could generate a significant number of jobs for Albertans. To identify the employment impact these projects could have on Alberta's economy, this report outlines specific construction and operational workforce requirements by year. A major resource project in this report is a project that has a value of $10 million or more.

2. In some cases, final project approval and timing of the resource projects may be dependent upon the outcome of environmental reviews.

3. Construction and operational workforce requirements of specific resource projects are based on information in Environmental Impacts Assessments (EIAs), estimates provided by companies in 1989 and projections based on similar type projects constructed previously.

4. The largest resource projects currently under construction in Alberta include the $1.2 billion Husky heavy oil upgrader and the $3 billion Nova pipeline expansion. During the period between now and 1997 it is anticipated that construction could begin on several other major projects including the $4.1 billion OSLO oil sands plant, the $800 million Dow Chemical ethylene project and the $1 billion Alberta Pacific pulp mill.

5. The oil, pipeline and forestry sectors likely will generate the largest number of construction jobs. The most significant number of operational jobs probably will be generated by the oil and forestry sectors. In the oil sector, the largest number of operational jobs will be in the plant operator, oil field, maintenance trade and management occupations. However, the greatest number of operational jobs created by the forestry projects will be in the woodland, plant operator, maintenance trade, management and millwright occupations.

6. If construction of major projects proceeds as outlined in this report, the demand for skilled trades workers in the construction industry will increase dramatically in the earlier 1990's. It is anticipated that this increased demand will create a need for training and recruiting strategies that will provide the province with a sufficient number of appropriately trained workers.

FIGURE 1.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR RESOURCE PROJECTS IN ALBERTA, 1988 - 1997 (1)

Sector	Project (Location)	Est. Total Cost ($M)	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Oil	Amoco (Cold Lake Area)	180										
	BP (Phases 2&3) (Wolf Lake)	490										
	Esso (Phases 7-8) (Cold Lake)	243										
	(Phases 9-10)	60										
	(Phases 11-12)	170										
	Esso (Cold Lake Area)	11										
	Husky (Lloydminster)	1270										
	Husky/ARC (Primrose Lake Air Weapons Range)	30										
	Gulf (Fort McMurray)	4100										
	Petro-Canada (Edmonton)	82										
	Shell (PREP II) (Peace River)	570										
	Shell (Virginia Hills)	127										
	Suncor (Fort McMurray)	200										
	Suncor (Phases 1A2) (Burnt Lake)	470										
	Turbo (Balzac)	15										
Gas	Alberta Energy Company Phase I (Primrose)	30										
	Alberta Natural Gas Co. Ltd. (Cochrane)	50										
	Amoco (Fort Saskatchewan)	10										
	Amoco (Wapisi Lake Area)	10										
	Chevron (Acheson)	18										
	Coho (Calgary Area)	11										
	Esso (West Pembina)	21										
	Esso (Bonnie Glen)	14										
	Interprovincial Pipeline (Edmonton)	40										
	Petro-Canada (Brazeau River)	67										
	Shell (Bearberry)	85										
	Shell or Husky (Caroline)	700										
	Total Petroleum (Progress)	10										
Petro-Chemical	ARC (Fort Saskatchewan) or Nova (Joffre)	400										
	Alberhan Industries (Bruderheim)	45										
	Can. Occidental Petroleum (Bruderheim)	60										
	Dow (Fort Saskatchewan)	800										
	Dupont (Gibbons)	120										
	Neste Oy (Edmonton)	300										
	Nova (Joffre)	35										
	Union Carbide (Prentiss)	385										
Mining	Carbovan Inc. (Phase 1-2)(Fort McMurray)	20										
	Magnesium Co. (Phases 1-3) (High River)	375										
Forestry	Alberta Energy Company (ARC) (Slave Lake)	140										
	Alberta Newsprint (ARC) (Whitecourt)	370										
	Alberta Newsprint (ARC) (Whitecourt)	30										
	Alberta Pacific - Pulp Mill (Athabasca)	1,000										
	Alberta Pacific - Paper Mill (Athabasca)	300										
	Daishowa (Peace River)	300										
	Erith Tie Company (Edson)	20										
	Northem (Lac La Biche)	18										
	Procter and Gamble Upgrade (Grande Prairie)	50										
	Procter and Gamble Pulp Mill (Gr. Prairie)	315										
	Procter and Gamble (Manning)	35										
	Sunpine (Rocky Mountain House)	32										
	Weldwood (Hinton)	361										
	Weldwood (Hinton)	50										
Pipeline	Alberta Energy Company (ARC) (Bonnyville)	22										
	Amoco/Foothills Pipeline	30										
	Cold Lake Pipeline	80										
	Gulf (Edson Area)	28										
	Nova	3000										
	Trans Mountain (Edmonton)	30										
	Trans Mountain	400										
Electric Utilities & Dams	Blood Indian Irrigation Proj. (Lethbridge)	85										
	Genesee I & II (Genesee)	1,300										
	Little Bow Dam (Hanton Area)	27										
	Oldman Dam (Pincher Creek)	185										
	Sheerness II (Sheerness)	370										
	Pine Coulee Dam (Granum Area)	35										
Agriculture	Cambra (Lethbridge)	10										
	Cargill (High River)	44										
	TOTAL EST. COST OF RESOURCE PROJECTS	$ 20.36 Billion										

Construction period. Limited construction during period. Construction continues beyond 1997.
Construction started before 1988.

(1) Includes only actual and announced investment over $10 million.

November 20, 1988

TABLE 1.0

A COMPARISON OF THE PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY RESOURCE SECTOR IN ALBERTA, 1989-1997

RESOURCE SECTOR	CONSTRUCTION WORKFORCE (IN WORK YEARS)									
	YEAR									
	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total 1989-1997
OIL	848	905	2281	1221	1600	3385	4705	6837	3990	25572
FORESTRY	2094	2248	1660	1185	400	700	250	0	0	8537
GAS	421	350	785	580	80	0	0	0	0	2176
PETROCHEMICALS	49	1183	1893	1087	1049	100	0	0	0	5361
MINING	135	48	120	185	150	73	0	0	0	711
PIPELINES	1171	1718	1590	1285	1320	1080	325	500	0	8987
ELECTRIC UTILITIES/DAMS	945	5[illegible]	241	219	117	45	20	14	9	2194
AGRICULTURE	100	0	15	5	0	0	0	0	0	120
TOTAL	5763	7034	8585	5747	4696	5383	5300	7151	3999	53658

TABLE 1.1

A COMPARISON OF THE PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY RESOURCE SECTOR IN ALBERTA, 1989-1997

RESOURCE SECTOR	OPERATIONAL WORKFORCE (ONGOING JOBS)									
	YEAR									
	1989	1990	1991	1992	1993	1994	1995	1996	1997	ONGOING JOBS BY 1997
OIL	21	43	43	418	510	898	785	1045	1644	1644
FORESTRY	627	1720	2520	3402	3802	3802	3802	3802	3802	3802
GAS	52	95	144	249	254	254	254	254	254	254
PETROCHEMICALS	8	99	232	370	670	670	670	670	670	670
MINING	83	171	171	317	317	452	452	452	452	452
PIPELINES	320	451	515	587	801	820	820	820	830	830
ELECTRIC UTILITIES/DAMS	74	78	78	78	78	78	80	80	80	80
AGRICULTURE	396	396	399	399	399	399	399	399	399	399
TOTAL	1581	3053	4102	5798	6431	6771	7082	7322	7831	7831

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TABLE 1.2

A COMPARISON OF CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR RESOURCE PROJECTS IN ALBERTA, 1989-1997(1)

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	212	178	217	145	121	45	111	218	159	1406
Bricklayer	28	6	6	10	3	4	2	0	0	59
Carpenter	393	487	596	424	242	152	205	491	285	3255
Cement Mason	56	64	65	52	38	30	15	12	7	339
Drilling Related Occs.	79	0	20	50	102	93	145	132	138	759
Electrician	676	699	829	503	407	258	334	657	481	4844
Insulator	152	197	325	231	171	119	249	81	119	1644
Ironworker	362	376	420	277	227	381	354	365	173	2935
Labourer	808	1124	1229	775	553	793	981	1290	443	7996
Millwright	236	273	266	162	92	92	102	111	53	1387
Oper. Engineer/Teamster	810	764	885	653	588	481	390	1089	427	5897
Pipefitter	478	623	609	418	349	388	330	415	201	3811
Sheet Metal	843	1010	1620	855	639	408	449	772	861	7257
Supervisory/Support	140	90	56	39	24	80	83	91	62	665
Welder	446	825	1014	832	843	1875	1506	1359	776	9478
Other	244	338	418	321	297	184	44	68	14	1928
Total Work Years	5763	7034	8585	5747	4698	5383	5300	7151	3999	53658

TABLE 1.3

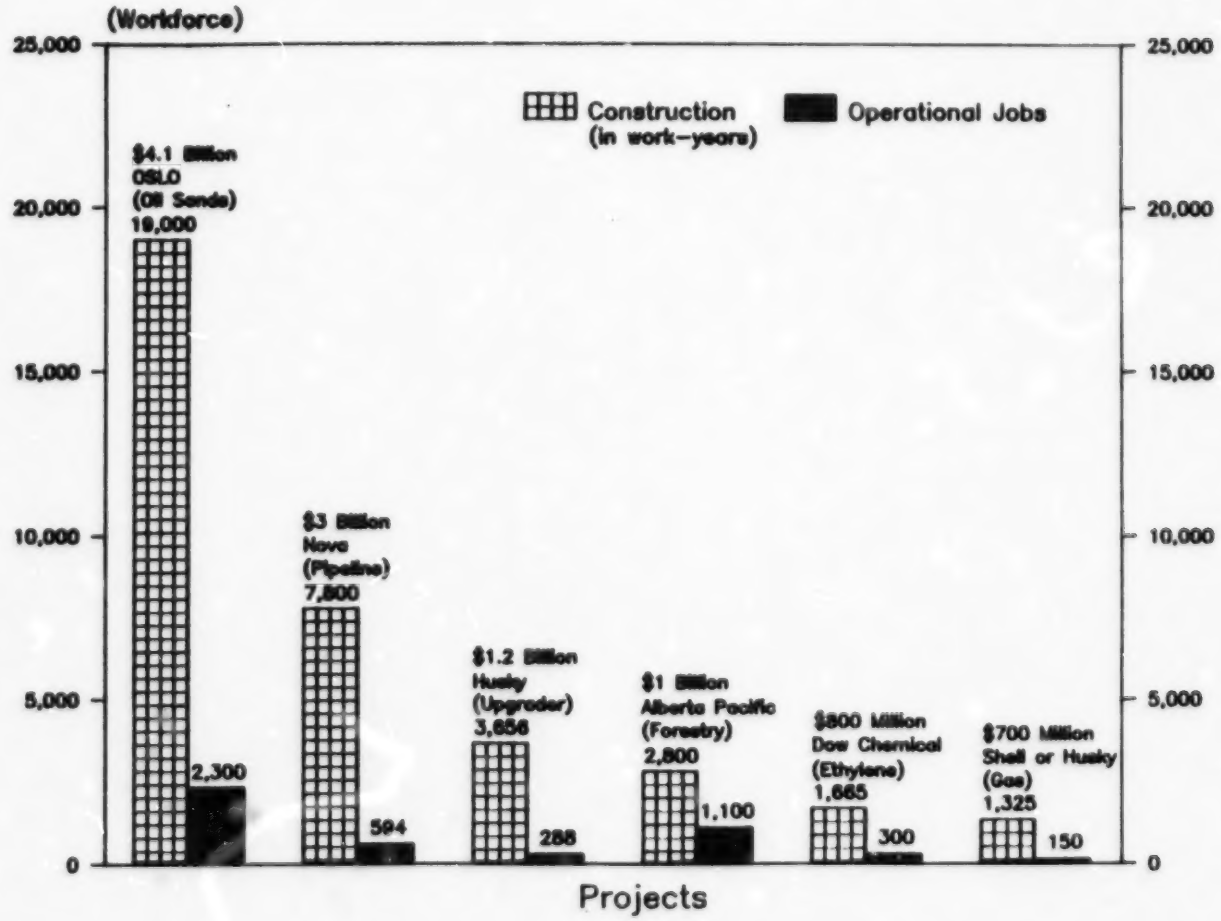
A COMPARISON OF OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR RESOURCE PROJECTS IN ALBERTA, 1989-1997 (1)

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	28	50	68	92	111	115	123	130	148	148
Electrician	33	56	77	111	142	148	155	168	201	201
Engineer	75	118	152	206	274	290	299	314	363	363
Instrumentation	31	59	76	113	148	157	165	180	202	202
Management	92	179	227	308	334	349	382	406	473	473
Millwright	56	106	143	181	206	211	225	232	254	254
Oilfield Occupations	3	8	8	28	52	107	128	163	202	202
Operating Engineer	8	17	23	38	50	52	55	82	175	175
Other Trades	338	386	436	546	582	598	612	622	635	635
Pipefitter	118	287	372	572	628	751	771	800	882	882
Plant Operator	20	40	52	76	89	91	96	95	96	96
Support Staff	186	504	718	1128	1238	1300	1418	1464	1527	1527
Technical	115	201	249	331	380	389	398	411	448	448
Welder	146	229	306	356	381	403	423	441	496	496
Woodland Occupations	8	22	37	60	85	89	91	93	108	108
Other	334	791	1160	1654	1721	1721	1721	1721	1721	1721
Total Ongoing Jobs	1591	3053	4102	5798	6431	6771	7062	7322	7931	7931

(1) Includes projects in the oil, gas, petrochemical, forestry, mining, electric utilities/dam and pipeline sectors.

FIGURE 1.1

A Comparison of Projected Construction and Operational Workforce Requirements for Selected Major Resource Projects(1)



(1) Includes only direct construction and operational jobs.

TABLE 1.4

A SUMMARY OF PROJECTED WORKFORCE REQUIREMENTS OF MAJOR RESOURCE PROJECTS IN ALBERTA, 1988 - 1997 (1)

Sector	Project (Location)	Est. Total Cost ($M)	Construction Work Years		Operation Workforce Ongoing Jobs	
			Total	1988 - 1997	Total	1988 - 1997
Oil	Amoco (Cold Lake Area)	150	200	200	50	50
	BP (Phases 2A3) (Wolf Lake) *	400	850	570	100	100
	Esso (Phases 7-8) (Cold Lake) * (Phases 9-10) (Phases 11-12)	285 90 170	905	370	190	190
	Esso (Cold Lake Area)	11	10	10	4	4
	Husky (Lloydminster)	1270	3,636	3,634	288	288
	Husky/AEC (Primrose Lake Air Weapons Range)	20	18	18	10	10
	Oslo (Fort McMurray)	4100	19,000	17,300	2,300	800
	Petro-Canada (Edmonton)	82	211	211	5	5
	Shell (PREP II) (Peace River)	570	2,111	1,627	280	210
	Shell (Virginia Hills)	127	500	300	8	8
	Suncor (Fort McMurray)	200	738	738	0	0
	Suncor (Phases 1&2) (Burnt Lake)	470	585	585	200	185
	Turbo (Balzac)	15	31	31	5	5
Gas	Alberta Energy Company Phase I (Primrose)	30	65	65	0	0
	Alberta Natural Gas Co. Ltd. (Cochrane)	50	120	120	5	5
	Amoco (Fort Saskatchewan) *	10	38	13	6	3
	Amoco (Hipisi Lake Area)	10	21	21	1	1
	Chevron (Acheson)	18	62	62	10	10
	Coho (Calgary Area)	11	23	23	6	6
	Esso (West Pembina) *	21	105	84	10	10
	Esso (Bonnie Glen) *	14	88	53	10	10
	Interprovincial Pipeline (Edmonton)	40	85	85	4	4
	Petro-Canada (Brazeau River) *	67	201	161	18	18
	Shell (Bearberry)	65	140	140	30	30
	Shell or Husky (Caroline)	700	1,325	1,325	150	150
	Total Petroleum (Progress)	10	24	24	7	7
Petro-Chemical	AEC (Fort Saskatchewan) or Nova (Joffre)	400	1,200	1,200	84	84
	Albchem Industries (Bruderheim)	45	68	68	25	25
	Can. Occidental Petroleum (Bruderheim)	80	90	90	28	28
	Dow (Fort Saskatchewan)	800	1,665	1,665	300	300
	Dupont (Sibbons)	130	282	282	65	65
	Neste Oy (Edmonton)	300	1,039	1,039	88	88
	Nova (Joffre)	35	87	87	4	4
	Union Carbide (Prentiss)	385	820	820	68	68
Mining	Carbovan Inc. (Phase 1-2)(Fort McMurray) *	20	43	55	36	36
	Magnesium Co. (Phases 1-3) (High River) *	375	888	656	416	416
Forestry	Alberta Energy Company (AEC) (Slave Lake)	140	300	300	135	135
	Alberta Newsprint (AEC) (Whitecourt)	378	853	804	375	375
	Alberta Newsprint (AEC) (Whitecourt)	50	110	110	15	15
	Alberta Pacific - Pulp Mill (Athabasca)	1,000	2,800	2,800	1,100	1,100
	Alberta Pacific - Paper Mill (Athabasca)	300	1,250	1,250	200	200
	Daishowa (Peace River) *	500	1,500	1,304	630	630
	Firth Tie Company (Edson)	20	80	80	150	150
	Northem (Lac La Biche)	10	80	80	140	140
	Procter and Gamble Upgrade (Gr Prairie) *	50	0	0	0	0
	Procter and Gamble Pulp Mill (Gr. Prairie)	315	800	800	300	300
	Procter and Gamble (Manning)	35	75	75	120	120
	Sunpine (Rocky Mountain House)	32	70	70	287	287
	Weldwood (Hinton) *	361	1,381	784	280	280
	Weldwood (Hinton)	30	120	120	80	80
Pipeline	Alberta Energy Company (AEC) (Bonnyville) *	22	42	7	0	0
	Amoco/Foothills Pipeline	30	68	68	1	1
	Cold Lake Pipeline	80	175	175	1	1
	Gulf (Edson Area)	38	84	84	6	6
	Nova *	3000	8,425	7,800	584	444
	Trans Mountain (Edmonton) *	30	51	47	0	0
	Trans Mountain	400	825	825	10	10
Electric Utilities & Dams	Blood Indian Irrigation Proj. (Lethbridge)	65	300	284	2	2
	Genesee I & II (Genesee) *	1,300	2,752	530	127	45
	Little Bow Dam (Newton Area)	27	200	200	0	0
	Oldman Dam (Pincher Creek) *	185	890	385	5	5
	Sheerness II (Sheerness) *	370	724	585	28	28
	Pine Coulee Dam (Gleneon Area)	35	250	250	0	0
Agriculture	Cambre (Lethbridge)	10	20	20	3	3
	Cargill (High River) *	44	200	100	388	388
	TOTAL EST. WORKFORCE REQUIREMENTS	$ 20.36 Billion	61,730	53,658	9,803	7,763

(1) Includes only actual and announced investment over $10 million.

* Construction started before 1988.

TABLE 1.5

TYPE OF PRODUCTION OF MAJOR RESOURCE PROJECTS IN ALBERTA, 1968 - 1987

Sector	Project (Location)	Est. Total Cost ($M)	Type of Plant/Production/Plant
Oil	Amoco (Cold Lake Area)	180	Heavy Oil Project
	BP (Phases 2&3) (Wolf Lake) *	400	Heavy Oil Project
	Esso (Phases 7-8), (Cold Lake) * (Phases 9-10), (Phases 11-12)	283 90 170	Heavy Oil Project
	Esso (Cold Lake Area)	11	Coal - Burning Project for Heavy Oil Recovery
	Husky (Lloydminster)	1270	Heavy Oil Upgrader
	Husky/AEC (Primrose Lake Air Weapons Range)	30	Heavy Oil Project
	Gulf (Fort McMurray)	4100	Oil Sands Plant
	Petro-Canada (Edmonton)	82	Refinery Isomerization Unit
	Shell (PRIP II) (Peace River)	570	Heavy Oil Project
	Shell (Virginia Hills) *	127	Enhanced Oil Recovery Project
	Suncor (Fort McMurray)	200	Oil Sands Debottlenecking Project
	Suncor (Phases 1A3) (Burnt Lake)	470	Heavy Oil Project
	Turbo (Balzac)	15	Upgrade of Oil Refinery
Gas	Alberta Energy Company Phase I (Primrose)	30	Natural Gas Project
	Alberta Natural Gas Co. Ltd. (Cochrane)	50	Gas Straddle Plant
	Amoco (Fort Saskatchewan) *	10	Gas Plant Expansion
	Amoco (Wapisi Lake Area)	10	Gas Plant
	Chevron (Ashcoom)	18	Gas Plant
	Coho (Calgary Area)	11	Sour Gas Plant
	Esso (West Pembina) *	21	Gas Plant
	Esso (Bonnie Glen) *	14	Gas Plant Expansion
	Interprovincial Pipeline (Edmonton)	40	Natural Gas Liquids Injection Facility
	Petro-Canada (Brazeau River) *	87	Sour Gas Plant Expansion
	Shell (Bearberry)	85	Sour Gas Plant
	Shell or Husky (Caroline)	700	Gas Plant and Related Facilities
	Total Petroleum (Progress)	10	Gas Plant
Petro-Chemical	AEC (Fort Saskatchewan) or Nova (Joffre)	400	Ethylene Plant
	Alberta Industries (Bruderheim)	45	Sodium Chlorate
	Can. Occidental Petroleum (Bruderheim)	80	Sodium Chlorate
	Dow (Fort Saskatchewan)	800	Ethylene Plant/Fractionation Plant
	Dupont (Gibbons)	120	Hydrogen Peroxide Plant
	Neste Oy (Edmonton)	300	Methyl Tertiary Butyl Ether (MTBE) Plant
	Nova (Joffre)	35	Pelletizing Plant
	Union Carbide (Prentiss)	385	Ethylene Glycol Plant
Mining	Carbovan Inc. (Phase 1-2)(Fort McMurray) *	20	Vanadium Extraction Plant
	Magnesium Co. (Phases 1-3) (High River) *	375	Magnesium Production Facility
Forestry	Alberta Energy Company (AEC) (Slave Lake)	148	Chemithermomechanical (CTMP) Pulp Mill
	Alberta Newsprint (AEC) (Whitecourt) *	378	Newsprint Mill
	Alberta Newsprint (AEC) (Whitecourt)	30	Paper Recycling Mill
	Alberta Pacific - Pulp Mill (Athabasca)	1,000	Pulp Mill
	Alberta Pacific - Paper Mill (Athabasca)	300	Paper Mill
	Daishowa (Peace River) *	500	Pulp Mill
	Erith Tie Company (Edson)	30	Sawmill
	Northem (Lac La Biche)	18	Sawmill
	Procter and Gamble Upgrade (Mt Prairie) *	50	Pulp Mill Expansion and Upgrade
	Procter and Gamble Pulp Mill (Mt. Prairie)	315	Pulp Mill
	Procter and Gamble (Slumming)	35	Sawmill
	Sampine (Rocky Mountain House)	32	Sawmill Complex Including Wood Treatment Plant
	Weldwood (Hinton) *	381	Pulp Mill Expansion
	Weldwood (Hinton)	50	Sawmill
Pipeline	Alberta Energy Company (AEC) (Bonnyville) *	22	Oil Pipeline
	Amoco/Foothills Pipeline	30	Compressor Station and Related Facilities
	Cold Lake Pipeline	80	Water Pipeline
	Gulf (Edson Area)	28	Gas Gathering System
	Nova *	3000	Gas Pipeline Expansion
	Trans Mountain (Edmonton) *	30	Storage and Pumping Facilities
	Trans Mountain	400	Oil Pipeline Between Edmonton and Vancouver
Electric Utilities & Dams	Blood Indian Irrigation Proj. (Lethbridge)	65	Irrigation Project
	Genesee I & II (Genesee) *	1,800	Thermal (Coal) Power Generating Plant
	Little Bow Dam (Benton Area)	27	Irrigation Dam
	Oldman Dam (Pincher Creek) *	185	Irrigation Dam
	Sheerness II (Sheerness) *	370	Thermal (Coal) Power Generating Plant
	Pine Coulee Dam (Granum Area)	35	Irrigation Dam
Agriculture	Cambro (Lethbridge)	10	Meat Packing Plant Expansion
	Cargill (High River) *	44	Meat Packing Plant
	TOTAL EST. WORKFORCE REQUIREMENTS	$ 20.36 Billion	

* Construction started before 1988.

TABLE 1.6

A Summary of Trade and Occupational Descriptions and Workforce Requirements Related to the Construction and Operation of New Major Resource Projects In Alberta

(All Construction Workforce Requirements are in Work-Years)

The purpose of this section is to provide a description and summary of the major trade requirements related to the construction and operation of new major resource projects now under construction or proposed for Alberta. A review of the resource projects indicates that careful planning and preparation should mitigate any skilled workforce shortages for the majority of resource projects. However, if in the 1992 to 1993 period construction proceeds on the $4.1 billion OSLO oil sands plant, the demand for skilled workers in the construction industry will increase dramatically. It is anticipated that this increased demand will create the need for a wide range of additional training and recruiting to ensure that the province has the workers required to meet this new demand.

Accounting/Purchasing Occupations

There are a diverse range of activities and occupations involved with accounting and purchasing in the operations phase. The most commonly cited types of workers that will be needed by companies include accountants, accounting clerks, purchasers and buyers, and purchasing agents. The only projects requiring a significant number of workers in these occupations are the $4.1 billion OSLO oil sands project (52) and the $3 billion Nova pipeline (34).

Boilermaker

The boilermaker builds, tests and repairs air-tight and liquid-tight containers. While boilermakers are essential during the construction phase for heavy oil and oil sands projects, only a few boilermakers, if any, are required during the operations phase according to estimates by the various companies. The Husky heavy oil upgrader, for example, is estimated to require only 3 boilermakers during the operations phase.

In work-years, the largest number of boilermakers required during the construction phase will be for the $4.1 billion OSLO oil sands project (567), and the $800 million Dow Chemical petrochemical project (151) the $615 million Genesee I and II project (111).

Bricklayer

The bricklayer lays brick, hollow tile and concrete block for buildings or other structures. Bricklayers are not required for the majority of resource projects. For forestry projects, the largest requirement in work-years for this occupational category is estimated to occur with the $500 million Daishowa pulp mill (19) and the $1 billion Alberta Pacific pulp mill (14).

Carpenter

A carpenter works with wood and wood substitutes in the construction of buildings and other structures. A substantial demand exists for carpenters during the construction phase for the new major oil and forestry projects proposed or in progress in Alberta.

In work-years, the largest number of carpenters estimated to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (925), the $1 billion Alberta Pacific pulp mill (402) and the Daishowa pulp mill (288).

Cement Worker

The cement worker is concerned with pouring and casting concrete at construction sites, levelling and smoothing concrete, erecting steel forms, applying grout and polishing terrazo. In comparison to the pipefitter and electrician trades, the cement worker does not account for a substantial percentage of time-input into constructing oil and forestry projects.

In work-years, the largest number of cement workers estimated to be required during the construction phase occurs with the $1 billion Alberta Pacific pulp mill (32) and the Oldman Dam (19).

Drilling Related Occupations

Workers in the drilling related occupations category are needed for heavy oil projects during both the construction and operation phase. The types of workers in drilling related occupations needed the most include drill crew workers, cementers, directional drillers, drilling foremen, well loggers, solids control technicians, drilling engineers and well servicing personnel.

Typically, more workers in drilling related occupations are required during the construction phase than in the operation phase. Esso, for example, estimates that Phases 7 to 10 of their Cold Lake project would require 140 work-years of drilling related work compared to only 40 ongoing oilfield supply workers during the operations phase. The largest demand for workers in drilling related occupations during the construction phase occurs with the $540 million Shell-Peace River heavy oil project (460).

Electrician

An electrician installs electrical wiring in buildings to supply heat, light and power. During the construction phase, the demand for electricians is estimated to be substantial for several projects involving the oil, forestry, electric utility and gas sectors.

In work-years, the largest number of electricians estimated to be required during the construction phase occurs with a $4.1 billion OSLO oil sands project (1310), the $3 billion Nova pipeline (692), the $1.2 billion Husky upgrader (338), the $361 billion Weldwood pulp mill (294), the $615 million Genesee I and II project (135) and the $700 million Shell Caroline project (145).

During the operations phase, the largest requirements for electricians are estimated to come from the $4.1 billion OSLO oil sands project (100), the $315 million Procter and Gamble pulp mill (20), the $800 million Dow Chemical petrochemical project (15) and the $615 million Genesee I and II project (11).

Engineer

There are a diverse range of engineering occupations required to operate resource projects. For example, the $4.1 billion OSLO oil sands project is estimated to require 209 engineers. The types of engineers that would be required for this type of oil sands plant include process engineers, maintenance engineers and mining and geology engineers. The $1 billion Nova pipeline requires an estimated 101 engineering related workers that would involve specialized training. The $800 million Dow Chemical petrochemical project requires an estimated 53 engineers that would include mainly process or chemical engineers and mechanical engineers. The $1 billion Alberta Pacific pulp mill requires an estimated 22 engineers that include control engineers, process engineers, maintenance engineers and project engineers. The $1.2 billion Husky heavy oil upgrader requires an estimated 11 engineers.

Heavy Equipment Operator

Heavy equipment operators or operating engineers operate cranes, hoisting, excavating and earth-moving equipment. The demand for this occupation is primarily during the construction phase. In work-years, the largest number of heavy equipment operators estimated to be required during the construction phase occurs with the $3 billion Nova pipeline (2325), $4.1 billion OSLO oil sands plant (1985), the $1.2 billion Husky heavy oil upgrader (178) and the $700 million Shell Caroline gas project (159). During the operations phase, the only significant demand for heavy equipment operators will come from the OSLO oil sands project. It is estimated that the OSLO will create 505 heavy equipment operator jobs.

Instrumentation Occupations

The range of activities of instrumentation occupations includes installing, maintaining, servicing and repairing, measuring and control instruments used at a plant. During the operations phase, the most commonly needed workers in this category included instrument technicians, instrument mechanics and instrument technologists. It is estimated that the major demand for instrumentation workers will be from the $4.1 billion OSLO oil sands project (44), the $500 million Daishowa pulp mill (30), the $315 Procter and Gamble pulp mill (30) and the $800 million Dow Chemical petrochemical project (11).

Insulator

An insulator installs insulation materials in commercial and industrial structures. In work-years, the largest number of insulators estimated to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (520), the $3 billion in Nova pipline (201), the $1 billion Alberta Pacific pulp mill (180), the $1.2 billion Husky heavy oil upgrader (106), the $800 million Dow Chemical petrochemical project (90).

Iron Worker

An ironworker builds, erects, constructs and joins structural steel on buildings. In work-years, the largest number of ironworkers estimated to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (1170), the $3 billion Nova pipeline (240), the $1.2 billion Husky heavy oil upgrader (171), the $1 billion Alberta Pacific pulp mill (129), and the $800 million Dow Chemical petrochemical project (101).

Labourer

This category includes occupations in labouring or other basic work such as general labour, tree clearing, grubbing and craft helpers, power saw operator, buffer and swamper. In work-years, the largest number of labourers to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (2790), the $3 billion Nova pipeline (1374), the $1 billion Alberta Pacific pulp mill (607), the $500 million Daishowa pulp mill (390) and the $1.2 billion Husky heavy oil upgrader (272).

Management Occupations

This category includes occupations concerned with managing activities directly related to the operation of the resource projects. This category often includes persons who are fully qualified in a specific occupation but the person is now managing persons in that occupational field. Management of this type for resource projects includes a wide range of occupational fields including maintenance, laboratory work, technical services, accounting, engineering and administration. It is estimated that the largest number of management occupations created by new resource projects include the $4.1 billion OSLO oil sands project (220), the $1 billion Alberta Pacific pulp mill (47), the $500 million Daishowa forestry project (44), the $1 billion Alberta Pacific paper mill (27) and the $1.2 billion Husky heavy oil upgrader (17).

Millwright

Millwrights install and maintain machinery in factories and other production plants such as an oil and forestry project. Some millwrights will be needed for both the construction and operation phase of a number of the resource projects proposed in Alberta. In work-years, the largest number of millwrights estimated to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (324), the $1 billion Alberta Pacific pulp mill (209), the $500 million Daishowa pulp mill (119), the $1.2 billion Husky heavy oil upgrader (71), the $370 million Sheerness power plant (Unit II) (44) and the $700 million Shell Caroline gas project (39).

During the operations phase, it is estimated that the largest number of millwright occupations created will be from the $4.1 billion OSLO oil sands project (58), the $500 million Daishowa pulp mill (32), the $1 billion Alberta Pacific pulp mill (31) and the $315 million Procter and Gamble pulp mill (20).

Other

Occupations included in the "Other" category during the construction phase includes road builders, site preparation workers, camp operators, building erectors, pile drivers, caterers, surveyors, rodmen and painters. This category was estimated to comprise only a small percentage of the total time input to construct the resource projects. Occupations included in the "Other" category during the operations phase include miscellaneous workers for capital projects, labourers, security guards, janitorial workers, waste disposal workers and vehicle operators. The labourers required for slaughter and fabrication at meat packing plants are also included in this category.

Other Trades

The "Other Trades" category includes occupations pertaining to the operations phase of the resource projects. Occupations in this category include carpenters, plumbers, boilermakers, maintenance personnel, machinists, heavy duty mechanics, warehouse technicians and auto mechanics. There are also occupations that require specialized training such as field operators for pipelines. The demand for trades in the "Other Trades" category is greatest with the $4.1 billion OSLO oil sands project (416). This latter figure includes mostly heavy duty mechanics and warehouse technicians. The $375 million Magnesium project also requires 312 jobs in the "Other Trades" Category. This includes occupations that require specialized training pertaining to reactor, gas handling, E-cell, refinery and casting. The "Other Trades" category generally comprises only a small number of total operation jobs for the remaining resource projects.

Pipefitter

The pipefitter of steamfitter installs steam and hot water heating systems and industrial process piping systems. Pipefitters play a very important role in the construction phase of oil, forestry, petrochemical and electric utility projects as their services are required throughout most of the construction period and their time input comprises a large percentage of the total work-years required to construct the project. In work-years, the largest number of pipefitters estimated to be required during the construction phase occurs with the $4.1 billion OSLO oil sands project (1,574), the $3 billion Nova pipeline (791), the $1.2 billion Husky upgrader project (697), the $800 million Dow Chemical petrochemical project (284), the $1 billion Alberta Pacific pulp mill (360), the $361 million Weldwood pulp mill (332). During the operations phase the largest demand for pipefitters is estimated to come from the $4.1 billion OSLO oil sands project (58), the $500 million Daishowa pulp mill (16) and the $1.2 billion Husky heavy oil upgrader (12). Very few pipefitters are required during the operations phase for the majority of the other resource projects.

Plant Operators

Plant operators play a significant and important role in the operation of many of the resource projects. For example, the $4.1 billion OSLO oil sands plants is estimated to require 255 plant operators - many of whom will be process operators. For heavy oil projects, the types of job titles contained in this category include plant operator, steam generation plant operator, crude dehydration plant operator, water treatment operator and control room operator. For forestry projects the range of plant operator jobs is much more diverse. A joint study by the Department of Career Development and Employment and the Department of Forestry, Lands and Wildlife entitled Training Needs Associated With Major Forestry Projects in Alberta outlines this wide range of jobs in further detail. For example, the Daishowa and Alberta Newsprint Company forestry projects according to this study require the following range of workers in the "plant operator" category:

Plant Operators for the Daishowa Forestry Project

Wood Handling:	
Materials Handling	4
Log Deck	8
Debarker	8
Chip Handling/Screening	4
Railcar Unloading	2
Mobile Equipment Operator	4
Crane Operator	8
Utility	8
Pulp Mill:	
Head Operator	4
Digester/Washing/Screening Operator	4
O_2 Delign./Bleaching/Chem. Prep. Operator	4
Machine Tender	4
Back Tender/Baling	4
Life Truck Operator, Baling Line	8
Life Truck Operator, Warehouse	2
Tester/Utility	4
Utility, Shift	8
Day	1
Steam/Recovery:	
Shift Engineer	4
Assistant Shift Engineer	4
Recovery Operator	4
Power Boiler/T.G. Operator	4
Recausticizing/Lime Kiln	4
Water/Effluent	1
Tester/Utility	4
Utility, Shift	4
Day	1
TOTAL	119

Plant Operators for the Alberta Newsprint Company Project

CTMP Plant (including steam plant)	24
Paper Machine	36
Finishing, Shipping	24
Material Handling, Yard	10
TOTAL	94

The type of plant operators anticipated to be required for the $1 billion Alberta Pacific forestry pulp mill include the following areas:

Crane Operator	Back Tender
Barker Operator	Baler Man
Deck Extra	Forklift Operator
Hdg. Fuel Driver	Utility
Chip Screening	Pulp Operator
Chip Cat Driver	Chem. Unloading
Machine Tender	Kiln Operator
	Water/Effluent

Sheet Metal

The sheet metal worker works with light gauge sheet metal in the production of heating, ventilating and air conditioning systems. This trade comprises only a small percentage of the construction workforce. In work-years, the largest number of sheet metal workers estimated to be required during the construction phase are the $4.1 billion OSLO oil sands plant (325), the $1 billion Alberta Pacific pulp mill (64), the $361 million Weldwood pulp mill (61) and the $300 million Alberta Pacific paper mill (54).

Supervisory/Support Workers

The "supervisory/support" pertains to construction occupations. Occupations placed in this category include supervisors, construction superintendents, managers, site engineers, warehouse personnel, inspectors, payroll staff, security foremen, clerical staff, accountants, janitorial work, first aid personnel and nurses. The "supervisory/support" category usually comprises from 3 to 5 per cent of the total construction workforce. Management and design (including engineering) and the commissioning staff for the Husky heavy oil upgrader was also included in this category since the company identified this type of staff as necessary to ensure completion of construction.

Supply Occupations - Oilfield

Oilfield supply occupations pertain to the operations phase of heavy oil projects. Generally there is slightly more than 1 plant operator at a heavy oil project for every oilfield supply worker. Position titles included in the oilfield supply category include field operators, service right workers, field maintenance, well service planners and field steam operators. During the operations phase, it is estimated that the largest number of oilfield supply workers will be required in the $570 million Shell heavy oil project (72) and Phases 7 to 10 of Esso's heavy oil project (40).

Woodlands Occupations

Woodland occupations pertain to the operations phase of forestry projects. Generally, there is slightly more than 1 plant operator at a forestry project for every woodland supply worker. Occupations in the woodlands supply sector include jobs in harvesting, timber, loading, trucking, decking contractor, developing access roads, reforestation and site preparation. During the operations phase, the largest demand for woodland occupations is estimated to come from the $1 billion Alberta Pacific pulp mill (660), the $500 million Daishowa project (300), the $360 million Weldwood project (210) and the $360 million Alberta Newsprint Company project (175).

Support Staff

The "support staff" category pertains to the operations phase of the resource projects (such as administration, clerical work and the relief pool). It comprises only a small percentage of the operations workforce. The largest demand for "support staff" is estimated to come from the $3 billion Nova pipeline (137), the $4.1 billion OSLO oil sands project (82), the $800 million Dow Chemical petrochemical project (38) and the $1 billion Alberta Pacific pulp mill (36).

Technical Occupations

The "technical" occupational category comprises only a small percentage of the operations workforce. Occupations in this category include data technicians, environmental technologists, geologists, general sciences occupations, computer programmers, lab technicians, planning technicians and rig technicians. Resource projects estimated to require the largest number of technical staff include the $1 billion Nova pipeline (201), the $4.1 billion OSLO oil sands project (91).

Welder

The welder joins metal together by fusion using an acetylene flame or an electric arc. Information contained on the demand for welder from Environment Impact Assessment (EIAs) and the companies was inconsistent amongst resource projects of the same type. Caution is therefore advised on the numbers contained in this paper since they are based on this information. In work-years, the largest number of welders estimated to be required during the construction phase occurs with the $3 billion Nova pipeline (760), the $700 million Shell Caroline gas project (119) and the $400 million Trans Mountain pipeline (99).

PART 2: OIL PROJECTS

FIGURE 2.0

ACTUAL AND PROJECTED TIMING OF NEW OIL PROJECTS IN ALBERTA, 1989 - 1997[1]

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Amoco (Cold Lake Area)	180									
BP (Phases 2&3) (Wolf Lake)	400									
Esso (Phases 7-12) (Cold Lake)	485									
Esso (Cold Lake)	11									
Husky (Lloydminster)	1270									
Husky/AEC (Primrose Lake Air Weapons Range)	20									
Oslo (Fort McMurray)	4100									
Petro-Canada (Edmonton)	82									
Shell (Phases II) (Peace River)	570									
Shell (Virginia Hills)	127									
Suncor (Fort McMurray)	200									
Suncor (Phases 1&2) (Burnt Lake)	470									
Turbo (Balzac)	15									

Construction period Construction continues beyond 1997.

TABLE 2.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR OIL PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project (Location)	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Amoco (Cold Lake Area)	160	CONS	0	0	0	20	180	0	0	0	0
		OPER	0	0	0	0	50	50	50	50	50
BP (Phases 2 & 3) (Wolf Lake)	400	CONS	175	0	0	0	230	165	0	0	0
		OPER	11	11	11	11	50	109	109	109	109
Esso (Phases 7-10) (Phases 11-12) (Cold Lake)	265 60 170	CONS	75	0	20	50	0	100	125	0	0
		OPER	0	0	0	80	80	130	130	190	190
Esso (Cold Lake Area)	11	CONS	4	6	0	0	0	0	0	0	0
		OPER	0	4	4	4	4	4	4	4	4
Husky (Lloydminster)	1270	CONS	152	783	2219	480	0	0	0	0	0
		OPER	0	0	0	288	288	288	288	288	288
Husky/AEC (Primrose Lake Air Weapons Range)	20	CONS	1	15	0	0	0	0	0	0	0
		OPER	0	10	10	10	10	10	10	10	10
Oslo (Fort McMurray)	4100	CONS	0	0	0	400	650	2900	4000	6000	3350
		OPER	0	0	0	5	10	15	20	150	600
Petro-Canada (Edmonton)	82	CONS	126	85	0	0	0	0	0	0	0
		OPER	2	5	5	5	5	5	5	5	5
Shell (PREP II) (Peace River)	570	CONS	0	0	0	0	0	40	580	537	470
		OPER	0	0	0	0	0	0	70	140	210
Shell (Virginia Hills)	127	CONS	300	0	0	0	0	0	0	0	0
		OPER	8	8	8	8	8	8	8	8	8
Suncor (Fort McMurray)	200	CONS	0	0	42	271	425	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Suncor (Phases 1A2) (Burnt Lake)	470	CONS	0	0	0	0	115	180	0	100	170
		OPER	0	0	0	0	0	72	86	86	165
Turbo (Balzac)	15	CONS	15	16	0	0	0	0	0	0	0
		OPER	0	5	5	5	5	5	5	5	5
TOTAL OIL PROJECTS		CONS	848	905	2281	1221	1800	3385	4705	6637	3990
		OPER	21	43	43	416	510	896	785	1045	1644

CONS - Construction
OPER - Operation

November 30, 1989

TABLE 2.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC OIL PROJECTS IN ALBERTA, (1)

PROJECT	Amoco	BP		Esso			Husky	Bus.	Calo	Pet.C.	Shell					Suncor			Turbo	Total Work Years
PHASE	1	2	3	7-10	11,12			ABC			1	2	3	4	Virg	Ft.M.	1	2		
TRADE																				
Boilermaker	11	21	17	6	6	0	71	0	567	3	18	14	11	12	10	21	2	2	2	792
Bricklayer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpenter	8	21	17	22	7	1	173	0	825	12	51	42	35	38	20	88	8	8	0	1435
Cement Mason	1	4	3	8	4	1	0	0	0	2	8	6	6	6	8	7	1	1	0	67
Drill. Rel. Occs.	38	97	81	140	58	0	0	0	0	0	115	115	110	120	50	0	50	45	0	1017
Electrician	18	41	33	72	18	1	338	2	1310	37	87	72	62	62	49	95	10	10	4	2320
Insulator	8	13	10	18	6	0	108	2	520	17	21	18	15	15	15	0	6	6	0	794
Ironworker	5	11	9	90	6	2	171	0	1170	7	25	21	17	18	15	103	11	10	0	1881
Labourer	19	37	32	83	20	1	272	3	2790	21	57	48	41	40	112	115	91	75	2	3859
Millwright	2	5	4	6	3	0	71	0	324	2	4	3	3	3	15	17	2	2	1	467
Heavy Equip. Oper.	12	20	17	25	8	0	178	4	1985	9	30	27	22	22	25	108	5	5	0	2502
Other	18	30	44	37	25	1	119	0	850	5	48	34	32	32	38	13	28	28	5	1505
Pipefitter	48	113	103	113	45	2	687	1	1574	58	133	114	94	98	85	119	38	33	11	3476
Sheet Metal	4	0	0	39	8	0	0	0	325	0	8	7	6	8	10	0	10	10	0	432
Sup./Support	8	28	25	50	10	1	1480	2	6580	14	18	16	16	16	43	30	14	14	2	8327
Welder	2	0	0	80	5	0	0	2	0	23	0	0	0	0	5	42	21	21	4	185
Total Work Years	200	481	395	770	225	10	3656	16	19000	211	620	537	470	484	500	738	295	270	31	28889

(1) Includes estimated workforce requirements to construct projects which either started before 1989 or construction continues beyond 1997.

TABLE 2.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC OIL PROJECTS IN ALBERTA, (2)

PROJECT	Amoco	BP		Esso			Husky	Bus.	Calo	Pet.C.	Shell					Suncor			Turbo	Total Work Years
PHASE		2	3	7-10	11,12			ABC			1	2	3	4	Virg	Ft.M.	1	2		
TRADE																				
Acct./Purch.	3	1	1	2	1	0	8	0	52	0	1	1	1	1	0	0	3	2	0	75
Electrician	1	2	2	4	2	0	8	0	100	0	2	2	2	2	0	0	2	2	0	132
Engineer	3	2	1	4	1	0	11	0	209	1	2	2	2	2	0	0	7	4	0	251
Instrumentation	1	3	3	10	5	0	3	0	44	0	5	5	5	5	0	0	3	3	0	95
Management	5	2	2	5	3	0	17	0	220	0	4	4	4	4	0	0	4	4	0	278
Millwright	0	3	3	1	0	0	8	0	58	0	1	0	0	0	0	0	2	1	0	75
Oilfield Occ.	14	13	17	48	17	0	0	5	0	0	18	18	18	18	0	0	24	24	0	226
Heavy Equip. Oper.	0	0	0	0	0	0	0	0	505	0	0	0	0	0	0	0	0	0	0	505
Other Trade	1	8	8	5	3	0	20	0	416	0	5	5	5	5	0	0	4	5	0	486
Pipefitter	1	1	1	0	0	0	12	0	53	0	0	0	0	0	1	0	1	1	0	71
Plant Operator	12	12	17	40	20	4	178	5	255	3	21	21	21	21	8	0	30	30	5	702
Support Staff	7	1	1	8	2	0	12	0	82	1	2	2	2	2	0	0	6	7	0	133
Technical	1	1	2	8	3	0	4	0	91	0	3	3	3	3	1	0	4	7	0	134
Welder	0	0	0	0	0	0	4	0	205	0	0	0	0	0	0	0	1	1	0	211
Other	1	3	3	5	3	0	5	0	10	0	6	7	7	7	0	0	8	8	0	75
Total Work Years	50	50	58	130	60	4	288	10	2300	5	70	70	70	70	8	0	100	100	5	3449

(2) Includes estimated workforce requirements to operate projects which either started before 1989 or operation staff is hired beyond 1997.

TABLE 2.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR OIL PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	20	19	54	8	33	41	110	215	159	660
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	31	71	103	34	58	58	172	485	285	1278
Cement Mason	9	1	1	3	6	6	8	6	7	47
Drilling Related Occs.	74	0	20	50	102	83	145	132	138	754
Electrician	82	51	248	93	105	80	289	627	481	2054
Insulator	21	17	80	32	22	82	225	70	119	648
Ironworker	28	69	105	69	88	266	326	355	173	1479
Labourer	112	88	175	76	127	471	883	1175	439	3526
Millwright	13	18	52	8	18	15	88	106	53	349
Heavy Equip. Oper.	44	39	131	80	98	184	272	919	425	2192
Other	53	28	88	21	58	151	307	394	200	1298
Pipefitter	145	74	553	142	193	155	388	753	681	3082
Sheet Metal	10	0	0	1	12	50	61	91	62	287
Supervisory/Support	181	420	671	581	644	1737	1470	1321	775	7810
Welder	25	12	2	12	38	15	3	8	13	128
Total Work Years	848	905	2281	1221	1600	3385	4705	6637	3990	25572

TABLE 2.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR OIL PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	0	0	0	7	11	15	17	24	41	41
Electrician	0	0	0	13	16	20	23	36	69	69
Engineer	1	1	1	18	21	29	33	48	95	95
Instrumentation	0	0	0	11	15	23	28	43	65	65
Management	0	0	0	24	31	36	42	66	132	132
Millwright	0	0	0	7	10	15	18	23	45	45
Oilfield Occupations	3	8	8	28	52	107	128	183	202	202
Heavy Equip. Oper.	0	0	0	1	3	3	4	31	124	124
Other	0	0	0	9	13	22	31	41	54	54
Other Trades	0	0	0	24	33	44	50	79	159	159
Pipefitter	1	1	1	13	15	17	18	17	18	18
Plant Operator	15	31	31	225	241	303	327	373	436	436
Support Staff	0	1	1	18	27	32	34	47	82	82
Technical	1	1	1	15	17	23	27	45	88	88
Welder	0	0	0	4	5	7	7	9	24	24
Total Ongoing Jobs	21	43	43	416	510	696	785	1045	1644	1644

November 30, 1989

FIGURE 2.1

Location of Major Oil Projects in Alberta

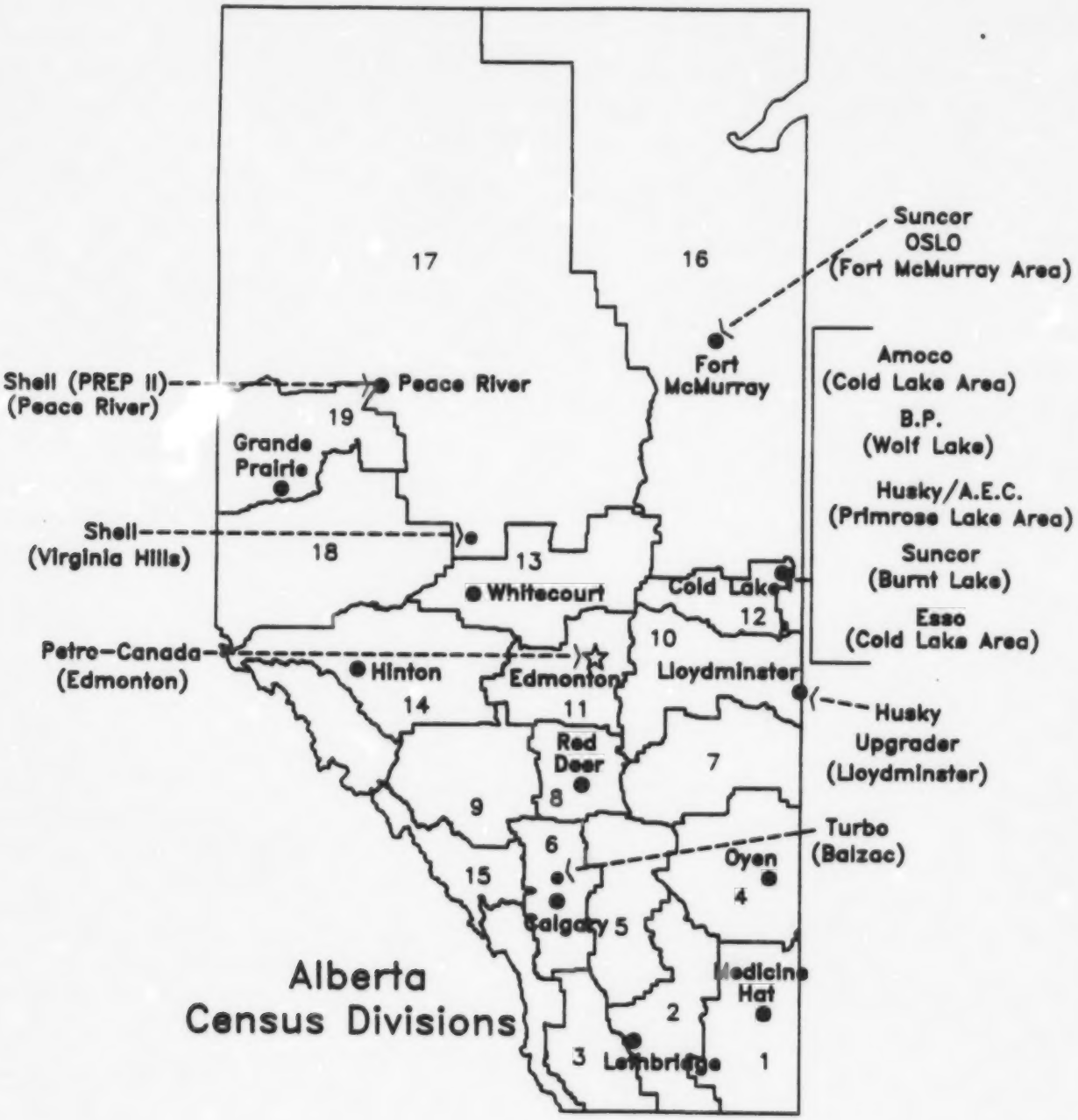


FIGURE 3.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR GAS PROJECTS IN ALBERTA, 1989 - 1997[1]

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Co. (Primrose	30		■							
Alberta Natural Gas Co. Ltd. (Cochrane)	50				■	■				
Amoco (Fort Saskatchewan)	10	←■								
Amoco (Wipisi Lake Area)	10	■								
Chevron (Acheson)	18	■								
Coho (Calgary Area)	11		■							
Esso (West Pembina)	21	←■								
Esso (Bonnie Glen)	14	←■								
Interprovincial Pipeline (Edmonton)	40			■						
Petro-Canada (Brazeau River)	67	←■								
Shell (Bearberry)	85		■							
Shell or Husky (Caroline)	700			■	■					
Total Petroleum (Progress)	10		■							

■ Construction period ←■ Construction started before 1989.

TABLE 3.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR GAS PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Co. (Primrose)	30	CONS	0	65	0	0	0	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Alberta Natural Gas Co. (Cochrane)	50	CONS	0	0	0	80	80	0	0	0	0
		OPER	0	0	0	0	5	5	5	5	5
Amoco (Fort Saskatchewan)	10	CONS	13	0	0	0	0	0	0	0	0
		OPER	3	3	3	3	3	3	3	3	3
Amoco (Wipisi Lake Area)	10	CONS	16	5	0	0	0	0	0	0	0
		OPER	1	1	1	1	1	1	1	1	1
Chevron (Acheson)	18	CONS	62	0	0	0	0	0	0	0	0
		OPER	10	10	10	10	10	10	10	10	10
Coho (Calgary Area)	11	CONS	0	23	0	0	0	0	0	0	0
		OPER	0	6	6	6	6	6	6	6	6
Esso (West Pembina)	21	CONS	84	0	0	0	0	0	0	0	0
		OPER	10	10	10	10	10	10	10	10	10
Esso (Bonnie Glen)	14	CONS	53	0	0	0	0	0	0	0	0
		OPER	10	10	10	10	10	10	10	10	10
Interprovincial Pipeline (Edmonton)	40	CONS	0	0	85	0	0	0	0	0	0
		OPER	0	0	4	4	4	4	4	4	4
Petro-Canada (Brazeau River)	67	CONS	181	0	0	0	0	0	0	0	0
		OPER	18	18	18	18	18	18	18	18	18
Shell (Bearberry)	85	CONS	30	120	0	0	0	0	0	0	0
		OPER	0	30	30	30	30	30	30	30	30
Shell or Husky (Caroline)	70P	CONS	0	125	700	500	0	0	0	0	0
		OPER	0	0	45	150	150	150	15	150	150
Total Petroleum (Progress)	10	CONS	12	12	0	0	0	0	0	0	0
		OPER	0	7	7	7	7	7	7	7	7
TOTAL GAS PROJECTS		CONS	421	350	785	580	80	0	0	0	0
		OPER	52	95	144	249	254	254	254	254	254

CONS - Construction
OPER - Operation

November 29, 1988

TABLE 3.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC GAS PROJECTS IN ALBERTA, (1)

PROJECT	AEC	AMC	Amoco		Chevron	Coho	Esso		Inter Prov. Pipe	Petro Canada	Shell		Total Petro.	Total Work Years
Cost ($ Millions)	30	50	10	10	18	11	21	14	40	67	65	700		
TRADE														
Boilermaker	0	6	2	0	0	0	6	4	0	8	6	43	1	76
Bricklayer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpenter	0	5	4	1	5	0	3	2	1	10	8	100	2	141
Cement Mason	0	1	0	1	0	0	1	0	0	1	2	13	0	19
Electrician	10	13	5	2	8	3	20	13	4	36	22	145	2	283
Insulator	2	4	1	1	2	1	6	5	3	18	10	43	2	98
Ironworker	6	7	2	2	5	2	2	2	4	10	7	80	1	130
Labourer	9	14	4	3	8	3	9	4	13	18	14	182	4	265
Millwright	3	4	1	0	3	1	1	0	3	3	2	39	1	61
Heavy Equip. Oper.	3	7	1	1	3	1	2	2	20	7	5	159	1	212
Other	5	7	4	0	4	2	6	3	12	8	2	53	0	106
Pipefitter	18	36	9	4	16	6	28	17	12	50	36	301	5	538
Sheet Metal	0	2	0	1	1	0	2	1	0	4	3	15	0	29
Supervisory/Support	4	5	2	3	3	1	10	7	5	11	10	53	2	116
Welder	5	9	3	2	4	3	9	6	8	17	13	119	3	201
Total Work Years	85	120	38	21	82	23	105	68	85	201	140	1325	24	2275

(1) Includes estimated workforce requirements to construct projects which started before 1989.

TABLE 3.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC GAS PROJECTS IN ALBERTA, (2)

PROJECT	AEC	AMC	Amoco		Chevron	Coho	Esso		Inter Prov. Pipe	Petro Canada	Shell		Total Petro.	Total Work Years
Cost ($ Millions)	30	50	10	10	18	11	21	14	40	67	65	700		
TRADE														
Acct./Purch.	0	0	0	0	0	0	0	0	0	1	1	2	0	4
Electrician	0	0	0	0	1	0	0	0	0	0	0	3	0	4
Engineer	0	0	0	0	0	0	0	0	0	0	0	4	0	4
Instrumentation	0	0	0	0	0	0	1	1	0	0	0	7	0	9
Management	0	0	0	0	1	0	1	1	1	2	4	13	0	23
Millwright	0	0	1	0	0	0	0	0	0	1	1	5	0	8
Heavy Equip. Oper.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Trades	0	0	0	0	2	2	1	1	2	2	4	11	1	26
Pipefitter	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Plant Operator	0	5	4	1	5	4	3	3	1	8	12	52	6	104
Support Staff	0	0	0	0	0	0	2	1	0	2	4	20	0	29
Technical	0	0	1	0	1	0	1	1	0	1	2	7	0	14
Welder	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Other	0	0	0	0	0	0	1	2	0	1	2	23	0	29
Total Work Years	0	5	6	1	10	6	10	10	4	18	30	150	7	257

(2) Includes estimated workforce requirements to operate projects which in some cases started hiring before 1989

TABLE 3.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR GAS PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	17	9	23	19	3	0	0	0	0	71
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	23	18	54	40	3	0	0	0	0	138
Cement Mason	3	3	7	6	0	0	0	0	0	19
Drilling Related Occs.	0	0	0	0	0	0	0	0	0	0
Electrician	70	48	81	80	7	0	0	0	0	286
Insulator	34	18	27	16	3	0	0	0	0	98
Ironworker	22	22	48	35	3	0	0	0	0	128
Labourer	38	42	99	68	6	0	0	0	0	253
Millwright	6	10	24	16	2	0	0	0	0	58
Oper. Engineer/Teamster	12	28	101	64	3	0	0	0	0	208
Other	18	13	40	23	4	0	0	0	0	98
Pipefitter	104	85	171	134	18	0	0	0	0	512
Sheet Metal	9	4	8	7	1	0	0	0	0	29
Supervisory/Support	31	19	33	22	3	0	0	0	0	108
Welder	34	35	71	50	4	0	0	0	0	194
Total Work Years	421	350	785	560	80	0	0	0	0	2176

TABLE 3.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR GAS PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	1	2	3	4	4	4	4	4	4	4
Electrician	1	1	2	4	4	4	4	4	4	4
Engineer	0	0	2	4	4	4	4	4	4	4
Instrumentation	2	2	6	9	9	9	9	9	9	9
Management	5	8	15	23	23	23	23	23	23	23
Millwright	2	3	6	8	8	8	8	8	8	8
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Operating Engineer	0	0	0	0	0	0	0	0	0	0
Other	4	4	7	27	27	27	27	27	27	27
Other Trades	8	11	17	24	24	24	24	24	24	24
Pipefitter	0	4	5	6	6	6	6	6	6	6
Plant Operator	21	31	46	84	89	89	89	89	89	89
Support Staff	5	17	22	37	37	37	37	37	37	37
Technical	5	9	11	16	16	16	16	16	16	16
Welder	0	2	2	3	3	3	3	3	3	3
Woodland	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	52	85	144	248	254	254	254	254	254	254

FIGURE 3.1

Location of Major Gas Projects in Alberta

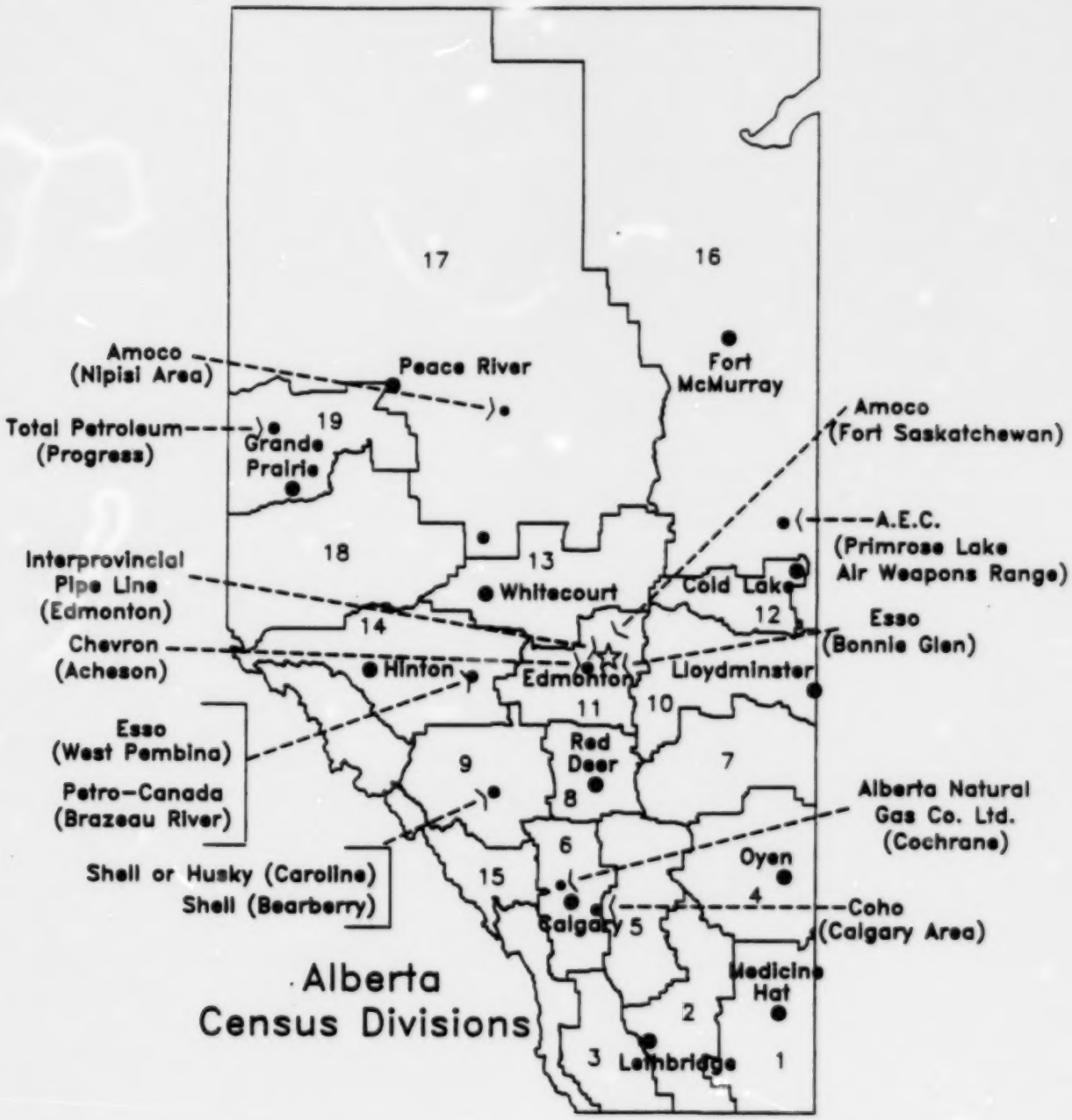


FIGURE 4.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR PETROCHEMICAL PROJECTS IN ALBERTA, 1989 - 1997(1)

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
AEC (Fort Sask) or NOVA (Joffre)	400									
Albchem Industries (Bruderheim)	45									
Canadian Occidental Petroleum (Bruderheim)	60									
Dow (Fort Saskatchewan)	800									
Dupont (Gibbons)	120									
Neste Oy (Edmonton)	300									
Nova (Joffre)	35									
Union Carbide (Prentiss)	385									

Construction period

1) Does not include projects completed in 1988. Includes only actual and announced investment to be spent during the period from 1988 to 1996.

TABLE 4.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR PETROCHEMICAL PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Co. (Fort Saskatchewan)	400	CONS	0	0	100	400	600	100	0	0	0
		OPER	0	0	0	94	94	94	94	94	94
Albchem Industries (Bruderheim)	45	CONS	0	45	23	0	0	0	0	0	0
		OPER	0	10	25	25	25	25	25	25	25
Canadian Occidental Petroleum (Bruderheim)	60	CONS	0	60	30	0	0	0	0	0	0
		OPER	0	9	26	26	26	26	26	26	26
DOW (Fort Saskatchewan)	800	CONS	42	218	425	531	449	0	0	0	0
		OPER	0	0	0	0	300	300	300	300	300
Dupont (Gibbons)	120	CONS	4	243	35	0	0	0	0	0	0
		OPER	8	53	65	65	65	65	65	65	65
Neste Oy (Edmonton)	300	CONS	3	405	631	0	0	0	0	0	0
		OPER	0	23	88	88	88	88	88	88	88
Nova (Joffre)	35	CONS	0	55	42	0	0	0	0	0	0
		OPER	0	4	4	4	4	4	4	4	4
Union Carbide (Prentiss)	385	CONS	0	157	807	156	0	0	0	0	0
		OPER	0	0	24	68	68	68	68	68	68
TOTAL PETROCHEMICAL PROJECTS		CONS	49	1183	1883	1087	1049	100	0	0	0
		OPER	8	99	232	370	670	670	670	670	670

CONS - Construction
OPER - Operation

November 30, 1988

TABLE 4.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC PETROCHEMICAL PROJECTS IN ALBERTA, 1988-1997

PROJECT	AEC or NOVA	Alb-Chem	Can. Occid. Pet.	Dow	Dupont	Neste Oy (1)	Nova	Union Carbide	Total Work Years
COST ($ MILLIONS)	400	45	60	800	120	300	35	385	
TRADE									
Boilermaker	98	3	5	151	11	86	0	0	355
Bricklayer	0	0	0	0	0	0	0	0	0
Carpenter	135	7	10	263	16	95	4	46	576
Cement Mason	19	1	1	0	5	11	1	35	73
Electrician	107	7	8	187	37	87	8	113	575
Insulator	75	4	6	90	16	36	6	40	273
Ironworker	87	5	7	101	18	90	6	38	350
Labourer	97	5	7	171	22	140	10	175	627
Millwright	15	1	1	39	11	28	5	30	128
Heavy Equip. Oper.	94	6	7	136	24	61	6	30	366
Other	29	2	2	82	3	59	3	16	196
Pipefitter	328	21	27	284	107	240	36	327	1368
Sheet Metal	0	0	0	0	0	0	0	0	0
Supervisory/Support	37	2	3	66	14	31	5	30	188
Welder	80	4	6	83	0	67	6	40	286
Total Work Years	1200	68	90	1885	282	1039	97	920	5361

TABLE 4.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC PETROCHEMICAL PROJECTS IN ALBERTA, 1988-1997

PROJECT	AEC or NOVA	Alb-Chem	Can. Occid. Pet.	Dow	Dupont	Neste Oy (1)	Nova	Union Carbide	Total Work Years
COST ($ MILLIONS)	400	45	60	800	120	300	35	385	
TRADE									
Acct./Purch.	0	1	1	11	2	2	0	7	24
Electrician	3	2	2	15	3	2	1	0	28
Engineer	13	1	1	53	4	9	0	4	85
Instrumentation	3	2	2	11	4	5	1	3	31
Management	4	2	2	13	3	2	0	0	26
Millwright	3	1	1	9	2	4	1	1	22
Heavy Equip. Oper.	0	0	0	3	6	0	0	5	14
Other Trades	5	2	2	25	0	0	0	0	34
Pipefitter	3	1	1	11	4	3	1	3	27
Plant Operator	43	8	8	84	28	27	0	25	204
Support Staff	13	1	1	38	3	11	0	7	74
Technical	1	1	1	16	2	21	0	8	50
Welder	3	1	1	11	3	2	0	0	21
Other	0	2	3	20	0	0	0	5	30
Total Work Years	94	25	26	300	85	88	4	68	670

TABLE 4.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR PETROCHEMICAL PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	0	56	116	98	81	4	0	0	0	355
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	7	131	180	134	117	7	0	0	0	578
Cement Mason	0	22	28	12	9	2	0	0	0	73
Drilling Related Occs.	5	0	0	0	0	0	0	0	0	5
Electrician	0	107	208	123	123	9	0	0	0	570
Insulator	0	29	90	58	89	6	0	0	0	273
Ironworker	6	87	131	88	56	8	0	0	0	356
Labourer	2	184	236	101	89	9	0	0	0	621
Millwright	10	30	45	24	28	1	0	0	0	138
Heavy Equip. Oper.	8	97	107	74	69	8	0	0	0	363
Other	8	68	74	20	25	5	0	0	0	196
Pipefitter	1	291	507	272	257	33	0	0	0	1361
Sheet Metal	2	0	0	0	0	0	0	0	0	2
Supervisory/Support	2	44	65	37	37	3	0	0	0	188
Welder	0	37	108	85	69	7	0	0	0	284
Total Work Years	49	1183	1883	1087	1049	100	0	0	0	5361

TABLE 4.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR PETROCHEMICAL PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	0	2	8	13	24	24	24	24	24	24
Electrician	1	5	10	13	28	28	28	28	28	28
Engineer	1	10	17	32	85	85	85	85	85	85
Instrumentation	1	8	16	20	31	31	31	31	31	31
Management	1	8	9	13	26	26	26	26	26	26
Millwright	0	3	9	13	22	22	22	22	22	22
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Heavy Equip. Oper.	1	4	8	11	14	14	14	14	14	14
Other	0	2	8	10	32	32	32	32	32	32
Other Trades	0	1	4	9	32	32	32	32	32	32
Pipefitter	1	4	11	18	27	27	27	27	27	27
Plant Operator	1	36	82	140	204	204	204	204	204	204
Support Staff	0	7	18	38	74	74	74	74	74	74
Technical	1	8	27	34	50	50	50	50	50	50
Welder	0	2	7	10	21	21	21	21	21	21
Woodland	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	8	99	232	370	670	670	670	670	670	670

FIGURE 4.1

Location of Major Petrochemical Projects in Alberta

PART 5: MINING PROJECTS

FIGURE 5.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR MINING PROJECTS IN ALBERTA, 1989 - 1997[1]

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Carbovan Inc. (Fort McMurray) Phase 1 and 2	Ph. 1 10 Ph. 2 20	←■		■	■					
Magnesium Co. of Canada (Phases 1-3) (High River)	375	←■	■	■	■	■	■			

■ Construction period ←■ Construction Started before 1989.

Mining projects category includes mineral processing plants.

TABLE 5.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR MINING PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Carbovan Inc. Ph 1,2 (Fort McMurray)	Ph. 1 10	CONS	15	0	20	20	0	0	0	0	0
	Ph. 2 10	OPER	33	33	33	36	36	36	36	36	36
Magnesium Company (Phases 1-3) (High River)	375	CONS	120	48	100	165	150	73	0	0	0
		OPER	60	138	138	281	281	416	416	416	416
TOTAL MINING PROJECTS		CONS	135	48	120	185	150	73	0	0	0
		OPER	93	171	171	317	317	452	452	452	452

CONS - Construction
OPER - Operation

November 30, 1989

TABLE 5.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC MINING RELATED PROJECTS IN ALBERTA, (1)

PROJECT	Carbovan Inc.		Magnesium Company			Total Work Years
PHASE	1	2	1	2	3	
TRADE						
Boilermaker	3	3	0	0	0	6
Bricklayer	0	0	0	0	0	0
Carpenter	0	0	0	0	0	0
Cement Mason	0	0	0	0	0	0
Electrician	15	12	18	27	22	94
Insulator	1	1	0	0	0	2
Ironworker	1	1	8	11	9	30
Labourer	7	7	11	16	13	54
Millwright	4	4	8	10	8	34
Heavy Equip. Oper.	0	0	36	53	45	134
Other	1	1	41	83	54	180
Pipefitter	3	3	19	29	25	79
Sheet Metal	2	2	0	0	0	4
Supervisory/Support	2	2	18	27	22	71
Welder	4	4	19	29	25	81
Total Work Years	43	40	178	265	223	749

(1) Includes estimated workforce requirements to construct the above projects which started construction before 1989.

TABLE 5.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC MINING RELATED PROJECTS IN ALBERTA, 1989-1997

PROJECT	Carbovan Inc.		Magnesium Company			Total Ongoing Jobs
PHASE	1	2	1	2	3	
TRADE/OCCUPATION						
Acct./Purch.	0	0	1	0	0	1
Electrician	2	0	3	2	2	9
Engineer	1	0	2	0	0	3
Instrumentation	2	0	2	2	1	7
Management	3	0	18	8	8	37
Millwright	2	0	1	0	0	3
Heavy Equip. Oper.	2	0	4	4	2	12
Other Trades (2)	1	0	90	112	110	313
Pipefitter	1	0	0	0	0	1
Plant Operator	16	3	0	0	0	19
Support Staff	2	0	8	5	4	17
Technical	0	0	7	5	1	13
Welder	1	0	2	4	2	9
Other	0	0	4	0	4	8
Total Ongoing Jobs	33	3	138	143	135	452

(2) The "Other Trades" category for the Magnesium project includes occupations that are trainable pertaining to reactor, gas handling, E-cell, refinery and casting.

TABLE 5.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR MINING PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	1	0	2	1	0	0	0	0	0	4
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	0	0	0	0	0	0	0	0	0	0
Cement Mason	0	0	0	0	0	0	0	0	0	0
Drilling	0	0	0	0	0	0	0	0	0	0
Electrician	17	8	15	24	15	7	0	0	0	84
Insulator	0	0	0	1	0	0	0	0	0	1
Ironworker	5	3	5	7	6	3	0	0	0	29
Labourer	8	4	9	14	9	4	0	0	0	48
Millwright	7	3	6	8	5	3	0	0	0	32
Heavy Equip. Oper.	24	8	20	33	30	15	0	0	0	130
Other	31	7	25	39	36	18	0	0	0	156
Pipefitter	14	6	13	19	17	8	0	0	0	77
Sheet Metal	1	0	1	1	0	0	0	0	0	3
Supervisory/Support	13	5	11	18	15	7	0	0	0	69
Welder	14	6	13	20	17	8	0	0	0	78
Total Work Years	135	48	120	185	150	73	0	0	0	711

TABLE 5.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR MINING PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	1	1	1	1	1	1	1	1	1	1
Electrician	4	5	5	7	7	9	9	9	9	9
Engineer	3	3	3	3	3	3	3	3	3	3
Instrumentation	4	4	4	6	6	7	7	7	7	7
Management	11	18	18	28	28	37	37	37	37	37
Millwright	3	3	3	3	3	3	3	3	3	3
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Heavy Equip. Oper.	5	8	8	10	10	12	12	12	12	12
Other	2	4	4	4	4	8	8	8	8	8
Other Trades	32	91	91	203	203	313	313	313	313	313
Pipefitter	1	1	1	1	1	1	1	1	1	1
Plant Operator	16	16	16	19	19	19	19	19	19	19
Support Staff	5	8	8	13	13	17	17	17	17	17
Technical	4	7	7	12	12	13	13	13	13	13
Welder	2	3	3	7	7	9	9	9	9	9
Woodland	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	93	171	171	317	317	452	452	452	452	452

FIGURE 5.1

Location of Major Mining Projects in Alberta

FIGURE 6.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR FORESTRY PROJECTS IN ALBERTA, 1989 - 1997

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Company (AEC) (Slave Lake)	188									
Alberta Newsprint (ANC) (Whitecourt)	379									
Alberta Newsprint ANC (Whitecourt)	50									
Alberta Pacific Forest Ind. - Pulp Mill (Athabasca)	1000									
Alberta Pacific Forest Ind. - Paper Mill (Athabasca)	300									
Daishowa (Peace River)	500									
Erith Tie Company (Edson)	30									
Northem (Lac La Biche)	18									
Procter and Gamble Upgrade & Expansion (Grande Prairie)	50									
Procter and Gamble New Pulp Mill (Grande Prairie)	315									
Procter and Gamble (Manning)	35									
Sunpine (Rocky Mountain House)	32									
Weldwood (Hinton)	381									
Weldwood (Hinton)	50									

Construction period. Construction started before 1989.

Limited construction during period.

TABLE 6.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR FORESTRY PROJECTS IN ALBERTA, 1988-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1988	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Company (AEC) (Slave Lake)	140	CONS	25	250	25	0	0	0	0	0	0
		OPER	0	135	135	135	135	135	135	135	135
Alberta Newsprint (ANC) (Whitecourt)	378	CONS	475	329	0	0	0	0	0	0	0
		OPER	100	375	375	375	375	375	375	375	375
Alberta Newsprint (ANC) (Whitecourt	50	CONS	0	0	50	60	0	0	0	0	0
		OPER	0	0	0	15	15	15	15	15	15
Alberta Pacific Forest Ind. - Pulp Mill (Athabasca)	1000	CONS	0	825	1200	675	0	0	0	0	0
		OPER	0	0	400	1100	1100	1100	1100	1100	1100
Alberta Pacific Forest Ind. - Paper Mill (Athabasca)	300	CONS	0	0	0	0	300	700	250	0	0
		OPER	0	0	0	0	0	0	200	200	200
Daishowa (Peace River)	500	CONS	790	514	0	0	0	0	0	0	0
		OPER	237	630	630	630	630	630	630	630	630
Firth Tie Company (Edson)	20	CONS	20	40	0	0	0	0	0	0	0
		OPER	0	150	150	150	150	150	150	150	150
Northern (Lac La Biche)	18	CONS	0	50	10	0	0	0	0	0	0
		OPER	0	140	140	140	140	140	140	140	140
Procter and Gamble Upgrade & Expansion (Grande Prairie)(1)	50	CONS	0	0	0	0	0	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Procter and Gamble New Pulp Mill (Grande Praire)	315	CONS	0	0	250	450	100	0	0	0	0
		OPER	0	0	0	100	300	300	300	300	300
Procter and Gamble (Manning)	35	CONS	0	45	30	0	0	0	0	0	0
		OPER	0	0	120	120	120	120	120	120	120
Sunpine (Rocky Mountain House)	33	CONS	0	45	25	0	0	0	0	0	0
		OPER	0	0	200	267	267	267	267	267	267
Weldwood (Hinton)	361	CONS	784	0	0	0	0	0	0	0	0
		OPER	290	290	290	290	290	290	290	290	290
Weldwood (Hinton)	50	CONS	0	50	70	0	0	0	0	0	0
		OPER	0	0	80	80	80	80	80	80	80
TOTAL FORESTRY PROJECTS		CONS	2094	2248	1860	1185	400	700	250	0	0
		OPER	627	1720	2520	3402	3802	3802	3802	3802	3802

CONS - Construction
OPER - Operation

(1) In-house construction

November 30, 1988

TABLE 6.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC FORESTRY PROJECTS IN ALBERTA, (1)

PROJECT	AEC	ANC		Alberta Pacific		Daish.	Erith	Procter and Gamble			Sun-Pine	Weldwood		Mort.	Total Work Years
Cost ($ Millions)	168	379	50	1000	300	500	20	315	50	35	32	361	50	18	
TRADE															
Boilermaker	0	0	3	28	0	0	0	11	0	0	0	82	0	0	125
Bricklayer	0	4	0	14	6	19	0	9	0	0	0	0	0	0	52
Carpenter	30	102	6	402	149	288	6	158	0	8	5	88	15	6	1263
Cement Mason	7	10	2	32	15	17	2	10	0	2	1	10	2	2	112
Electrician	49	84	11	207	123	119	10	74	0	13	13	294	12	11	1020
Insulator	0	27	6	180	40	40	4	87	0	5	4	31	4	3	411
Ironworker	15	84	9	128	123	136	5	43	0	6	4	145	8	5	712
Labourer	36	149	10	607	218	390	7	163	0	9	8	169	32	8	1806
Millwright	9	68	3	209	100	119	4	51	0	5	7	68	8	3	652
Heavy Equipment Oper.	21	65	8	100	45	17	5	15	0	6	8	48	4	5	347
Other	9	37	7	319	104	147	4	18	0	4	1	15	10	5	680
Pipefitter	45	140	29	380	185	212	5	122	0	5	4	332	7	4	1480
Sheet Metal	19	37	3	84	54	17	3	24	0	5	5	61	8	3	303
Supervisory/Support	60	46	8	112	67	64	5	32	0	7	6	40	8	5	480
Welder	0	0	5	38	11	5	0	3	0	0	4	0	2	0	68
Total Work Years	300	853	110	2800	1250	1590	60	800	0	75	70	1381	120	80	9489

(1) Includes total estimated construction workforce to build each forestry project.

TABLE 6.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC FORESTRY PROJECTS IN ALBERTA, 1988-1997

PROJECT	AEC	ANC		Alberta Pacific		Daish.	Erith	Procter and Gamble			Sun-pine	Weldwood		Mort.	Total Ongoing Jobs
Cost ($ Millions)	168	379	50	1000	300	500	30	315	50	35	32	361	50	16	
TRADE/OCCUPATION															
Acct./Purch.	2	7	0	10	6	6	2	6	0	1	2	0	1	0	43
Electrician	1	4	0	10	4	10	5	20	0	3	7	3	2	5	74
Engineer	5	4	0	22	5	7	0	8	0	0	4	2	0	3	80
Instrumentation	1	3	0	11	3	30	0	30	0	0	2	5	0	1	86
Management	8	27	0	47	27	44	5	8	0	4	18	8	3	8	201
Millwright	4	13	0	31	13	32	9	20	0	4	9	6	2	6	149
Heavy Equipment Oper.	0	0	3	2	0	0	0	10	0	0	1	0	0	1	17
Other Trades	2	14	5	30	14	29	29	20	0	8	34	0	3	10	198
Pipefitter	2	4	0	10	4	16	0	0	0	0	0	7	0	0	43
Plant Operator	38	84	3	133	84	103	30	40	0	28	71	44	17	52	747
Support Staff	3	8	1	36	7	22	6	2	0	5	7	0	4	5	108
Technical	3	16	2	19	16	11	3	10	0	3	8	5	2	6	104
Welder	1	2	0	5	2	5	2	20	0	1	4	0	2	2	46
Woodland Occupations (2)	86	175	0	680	0	300	40	100	0	80	80	210	30	35	1756
Other	1	4	1	74	5	15	19	8	0	3	20	0	14	8	172
Total Ongoing Jobs	135	375	15	1100	200	630	150	300	0	120	287	290	80	140	3802

(2) Some woodland jobs are seasonal. In those cases, the projected workforce is converted (reduced) to a full-time work year.

TABLE 6.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR FORESTRY PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	47	7	14	18	4	0	0	0	0	90
Bricklayer	21	6	6	10	3	4	2	0	0	52
Carpenter	296	222	245	203	58	83	16	0	0	1123
Cement Mason	20	26	22	12	6	8	3	0	0	97
Drilling Related Occs.	0	0	0	0	0	0	0	0	0	0
Electrician	260	238	140	98	39	68	25	0	0	870
Insulator	41	81	86	92	26	22	18	0	0	366
Ironworker	243	117	83	81	37	69	21	0	0	631
Labourer	369	460	364	229	86	122	37	0	0	1647
Millwright	132	170	112	88	22	56	31	0	0	609
Heavy Equipment Oper.	80	102	86	19	23	20	5	0	0	315
Other	45	224	156	91	36	62	8	0	0	622
Pipefitter	360	332	221	178	42	112	51	0	0	1296
Sheet Metal	85	74	45	30	11	30	22	0	0	297
Supervisory/Support	95	174	79	42	24	38	9	0	0	461
Welder	0	14	21	15	3	6	2	0	0	61
Total Work Years	2094	2248	1660	1185	400	700	250	0	0	8537

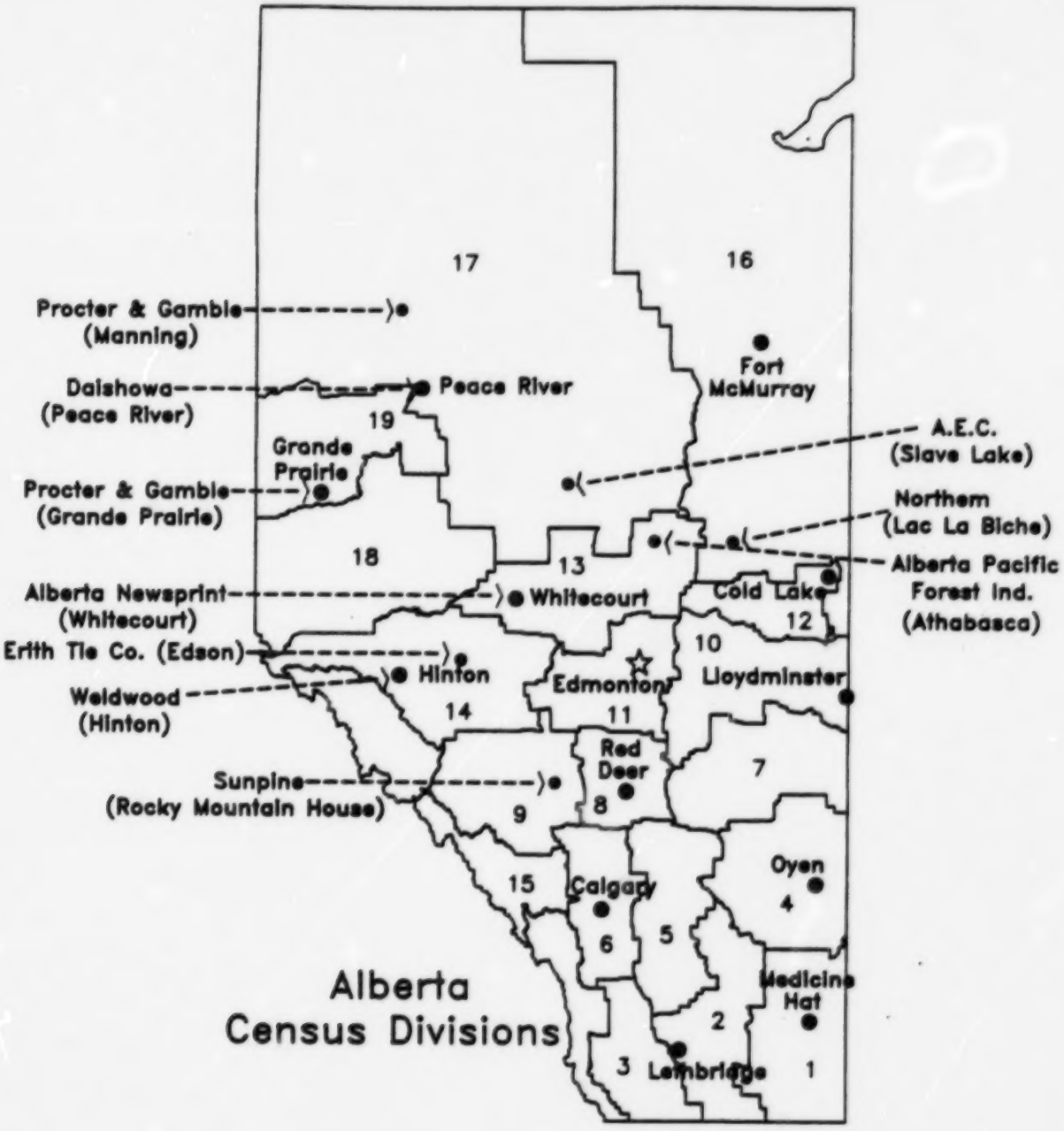
TABLE 6.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR FORESTRY PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	4	17	25	33	37	37	43	43	43	43
Electrician	10	28	43	57	70	70	74	74	74	74
Engineer	7	21	34	50	55	55	60	60	60	60
Instrumentation	20	40	48	63	83	83	86	86	86	86
Management	38	101	140	175	179	179	208	208	208	208
Millwright	24	70	98	123	136	136	149	149	149	149
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Heavy Equipment Oper.	0	1	3	10	17	17	17	17	17	17
Other	7	31	91	165	171	171	176	176	176	176
Other Trades	16	101	157	188	201	201	215	215	215	215
Pipefitter	18	29	33	39	39	39	43	43	43	43
Plant Operator	118	370	520	635	682	682	736	736	736	736
Support Staff	14	44	73	98	99	99	106	106	106	106
Technical	18	44	75	81	88	88	104	104	104	104
Welder	3	12	22	31	44	44	46	46	46	46
Woodlands Occs.	334	781	1180	1634	1721	1721	1721	1721	1721	1721
Total Ongoing Jobs	627	1720	2520	3402	3802	3802	3802	3802	3802	3802

FIGURE 6.1

Location of Major Forest Projects in Alberta – Under Construction



PART 7: PIPELINE PROJECTS

FIGURE 7.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR PIPELINE PROJECTS IN ALBERTA, 1989 - 1997(1)

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Co. (Bonnyville)	22	■								
Amoco/Foothills Pipeline (Yukon)	30		■							
Cold Lake Pipeline	80					■				
Gulf (Edson Area)	28		■							
Nova	3000	■	■	■	■	■	■			
Trans Mountain (Edmonton)	30	■								
Trans Mountain	400								■	

■ Construction period

(1) Includes only actual and announced investment to be spent during the period from 1989 to 1997.

TABLE 7.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR PIPELINE PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Alberta Energy Co. (Bonnyville)	22	CONS	7	0	0	0	0	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Amoco/Foothills Pipeline (Yukon)	30	CONS	0	89	0	0	0	0	0	0	0
		OPER	0	1	1	1	1	1	1	1	1
Cold Lake Pipeline	80	CONS	0	0	0	55	120	0	0	0	0
		OPER	0	0	0	0	1	1	1	1	1
Gulf (Edson Area)	28	CONS	7	57	0	0	0	0	0	0	0
		OPER	0	6	6	6	6	6	6	6	6
Nova	3000	CONS	1110	1590	1590	1230	1200	1080	0	0	0
		OPER	320	444	508	580	593	612	612	612	612
Trans Mountain (Edmonton)	30	CONS	47	0	0	0	0	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Trans Mountain	400	CONS	0	0	0	0	0	0	325	500	0
		OPER	0	0	0	0	0	0	0	10	10
TOTAL PIPELINE PROJECTS		CONS	1171	1716	1590	1285	1320	1080	325	500	0
		OPER	320	451	515	587	601	620	620	620	630

CONS - Construction
OPER - Operation

(2) Includes only estimated construction workforce from Alberta

November 30, 1989

TABLE 7.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC PIPELINE PROJECTS IN ALBERTA, (1)

PROJECT	Alta. Energy Co.	Amoco/ Foot-Hills	Cold Lake	Gulf	Nova	Trans Mtn.	Trans Mtn.	Total Work Years
Cost ($ Millions)	22	30	80	28	3000	30	400	
TRADE								
Boilermaker	0	1	0	0	26	12	4	43
Bricklayer	0	0	0	0	0	0	0	0
Carpenter	0	4	0	0	0	2	41	47
Cement Mason	0	1	0	0	80	0	8	89
Electrician	8	15	33	3	692	4	50	805
Insulator	1	0	4	0	201	0	17	223
Ironworker	1	7	4	0	240	1	17	270
Labourer	7	8	31	11	1374	2	186	1617
Millwright	1	2	4	0	135	0	8	150
Heavy Equip. Oper.	13	4	52	24	2325	5	273	2696
Other	1	0	7	2	1161	5	33	1209
Pipefitter	1	28	4	0	791	20	31	875
Sheet Metal	0	0	0	0	0	0	0	0
Supervisory/Support	4	1	16	6	640	0	58	725
Welder	5	0	20	18	760	0	99	902
Total Work Years	42	69	175	64	8425	51	825	9651

(1) Includes estimated workforce requirements to construct the pipeline projects which in some cases started construction before 1989.

TABLE 7.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC PIPELINE PROJECTS IN ALBERTA, (2)

PROJECT	Alta. Energy Co.	Amoco/ Foot-Hills	Cold Lake	Gulf	Nova	Trans Mtn.	Trans Mtn.	Total Work Years
Cost ($ Millions)	22	30	80	28	3000	30	400	
TRADE								
Acct./Purch.	0	0	0	0	32	0	1	33
Electrician	0	0	0	0	0	0	0	0
Engineer	0	0	0	0	105	0	2	107
Instrumentation	0	0	0	0	0	0	0	0
Management	0	0	0	0	19	0	1	20
Millwright	0	0	0	0	0	0	0	0
Heavy Equip. Oper.	0	0	0	0	0	0	0	0
Other Trades	0	0	1	2	124	0	2	129
Pipefitter	0	0	0	0	0	0	0	0
Plant Operator	0	1	0	4	0	0	0	5
Support Staff	0	0	0	0	109	0	2	111
Technical	0	0	0	0	208	0	2	210
Welder	0	0	0	0	2	0	0	2
Other	0	0	0	0	13	0	0	13
Total Work Years	0	1	1	6	612	0	10	630

(2) Includes total workforce requirements to be hired on as a result of the project.

TABLE 7.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR PIPELINE PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	11	1	0	0	0	0	1	3	0	16
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	5	8	4	5	1	1	16	25	0	65
Cement Mason	0	1	0	12	12	12	3	5	0	45
Drilling Related Occs.	0	0	0	0	0	0	0	0	0	0
Electrician	105	148	128	103	118	94	20	30	0	744
Insulator	28	40	40	31	31	29	6	11	0	214
Ironworker	31	55	48	37	37	35	7	10	0	260
Labourer	188	288	274	213	224	173	75	111	0	1546
Millwright	16	28	24	19	19	17	3	5	0	129
Heavy Equip. Oper.	285	428	402	312	332	240	107	166	0	2270
Other	159	204	202	203	180	150	13	20	0	1127
Pipefitter	117	176	148	110	112	100	12	19	0	794
Sheet Metal	0	0	0	0	0	0	0	0	0	0
Supervisory/Support	81	127	120	87	93	82	23	35	0	848
Welder	151	218	200	153	161	147	39	60	0	1129
Total Work Years	1171	1716	1590	1285	1320	1080	325	500	0	8987

TABLE 7.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR PIPELINE PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	20	28	27	32	32	32	32	32	33	33
Electrician	0	0	0	0	0	0	0	0	0	0
Engineer	54	74	86	92	97	105	105	105	107	107
Instrumentation	0	0	0	0	0	0	0	0	0	0
Management	10	13	15	16	18	19	19	19	20	20
Millwright	0	0	0	0	0	0	0	0	0	0
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Heavy Equip. Oper.	0	0	0	0	0	0	0	0	0	0
Other	0	0	3	8	10	13	13	13	13	13
Other Trades	54	73	83	114	125	127	127	127	129	129
Pipefitter	0	0	0	0	0	0	0	0	0	0
Plant Operator	0	5	5	5	5	5	5	5	5	5
Support Staff	70	103	108	107	109	109	109	109	111	111
Technical	112	157	180	193	203	208	208	208	210	210
Welder	0	0	0	2	2	2	2	2	2	2
Woodlands	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	320	451	515	567	601	620	620	620	630	630

PART 8: ELECTRIC UTILITY/DAM PROJECTS

FIGURE 8.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989 - 1997[1]

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Blood Indian Irrigation Project (Lethbridge)	85									
Genesee I & II (Genesee)	1300									
Little Bow Dam (Nanton Area)	27									
Oldman Dam (Pincher Creek)	185									
Sheerness II (Sheerness)	370									
Pine Coulee Dam (Granum)	35									

Construction period. Construction started before 1989.

Limited construction during period.

Construction continues beyond 1997.

TABLE 8.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Blood Indian Irrigation Project (Lethbridge)	85	CONS	0	14	46	49	67	45	20	14	9
		OPER	0	0	0	0	0	0	2	2	2
Genesee I & II (1) (Genesee)	1300	CONS	145	350	35	0	0	0	0	0	0
		OPER	45	45	45	45	45	45	45	45	45
Little Bow Dam (Nanton Area)	27	CONS	0	30	80	70	40	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
Oldman Dam (Pincher Creek)	185	CONS	295	70	0	0	0	0	0	0	0
		OPER	1	5	5	5	5	5	5	5	5
Sheerness II (Sheerness)	370	CONS	505	80	0	0	0	0	0	0	0
		OPER	28	28	28	28	28	28	28	28	28
Pine Coulee Dam (Granum Area)	35	CONS	0	40	100	100	10	0	0	0	0
		OPER	0	0	0	0	0	0	0	0	0
TOTAL ELECTRICAL UTILITY/DAM PROJECTS		CONS	945	584	241	219	117	45	20	14	9
		OPER	74	78	78	78	78	78	80	80	80

CONS - Construction
OPER - Operation

(1) An estimated 82 operational staff were hired in 1989.

TABLE 8.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989-1997

PROJECT	Blood Indian (1)	Genesee I & II	Little Bow Dam	Oldman Dam	Sheerness II	Pine Coulee	Total Work Years
TRADE							
Boilermaker	0	111	0	0	94	0	205
Bricklayer	0	0	0	0	0	0	0
Carpenter	11	15	7	16	11	11	71
Cement Mason	10	6	6	18	1	10	52
Electrician	0	135	0	8	97	0	240
Insulator	0	12	0	0	27	0	39
Ironworker	0	32	0	0	9	0	41
Labourer	79	21	68	59	41	80	348
Millwright	0	12	0	0	44	0	56
Heavy Equipment Oper.	79	11	68	142	41	75	416
Other	24	60	14	99	88	28	313
Pipefitter	0	61	0	0	77	0	138
Sheet Metal	0	16	0	0	29	0	45
Supervisory/Support	53	22	32	22	17	40	186
Welder	8	16	5	0	9	6	44
Total Work Years	284	530	200	365	585	250	2194

(1) Includes only estimated construction requirements to construct the above projects between 1989 and 1997.

TABLE 8.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989-1997(2)

PROJECT	Blood Indian	Genesee I & II	Little Bow Dam	Oldman Dam	Sheerness II (3)	Pine Coulee	Total Ongoing Jobs
TRADE/OCCUPATION							
Acct./Purch.	0	0	0	0	0	0	0
Electrician	0	11	0	9	4	0	15
Engineer	0	0	0	1	0	0	1
Instrumentation	0	2	0	0	0	0	2
Management	0	3	0	0	1	0	4
Millwright	0	15	0	0	10	0	25
Heavy Equipment Oper.	2	0	0	4	0	0	6
Other Trades	0	0	0	0	2	0	2
Pipefitter	0	0	0	0	0	0	0
Plant Operator	0	5	0	0	10	0	15
Support Staff	0	1	0	0	0	0	1
Technical	0	2	0	0	1	0	3
Welder	0	1	0	0	0	0	1
Other	0	5	0	0	0	0	5
Total Ongoing Jobs	2	45	0	5	28	0	80

(2) Includes only estimated operational staff to be hired for each project between 1989 and 1997.
(3) Unit 1 of the Sheerness Power Project employed 74 persons in July 1989.

TABLE 8.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR SPECIFIC ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	111	88	8	0	0	0	0	0	0	205
Bricklayer	0	0	0	0	0	0	0	0	0	0
Carpenter	25	19	10	8	5	2	1	1	0	71
Cement Mason	19	11	8	7	5	2	1	1	0	52
Drilling	0	0	0	0	0	0	0	0	0	0
Electrician	130	102	8	0	0	0	0	0	0	240
Insulator	26	12	1	0	0	0	0	0	0	39
Ironworker	17	23	1	0	0	0	0	0	0	41
Labourer	87	58	70	73	32	14	8	4	4	348
Millwright	39	16	1	0	0	0	0	0	0	56
Heavy Equipment Oper.	152	88	88	71	33	14	8	4	2	416
Other	169	81	24	21	10	4	2	1	1	313
Pipefitter	88	46	4	0	0	0	0	0	0	138
Sheet Metal	31	12	2	0	0	0	0	0	0	45
Supervisory/Support	39	36	34	34	27	8	4	3	1	186
Welder	12	18	4	5	5	1	0	0	1	44
Total Work Years	945	584	241	219	117	45	20	14	9	2194

TABLE 8.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR SPECIFIC ELECTRIC UTILITY/DAM PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	0	0	0	0	0	0	0	0	0	0
Electrician	15	15	15	15	15	15	15	15	15	15
Engineer	1	1	1	1	1	1	1	1	1	1
Instrumentation	2	2	2	2	2	2	2	2	2	2
Management	4	4	4	4	4	4	4	4	4	4
Millwright	25	25	25	25	25	25	25	25	25	24
Oilfield Oscs.	0	0	0	0	0	0	0	0	0	0
Heavy Equipment Oper.	0	4	4	4	4	4	8	8	8	8
Other	5	5	5	5	5	5	5	5	5	5
Other Trades	2	2	2	2	2	2	2	2	2	2
Pipe Fitter	0	0	0	0	0	0	0	0	0	0
Plant Operator	15	15	15	15	15	15	15	15	15	15
Support Staff	1	1	1	1	1	1	1	1	1	9
Technical	3	3	3	3	3	3	3	3	3	3
Welder	1	1	1	1	1	1	1	1	1	1
Woodland	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	74	78	78	78	78	78	80	80	80	80

November 30, 1989

FIGURE 8.1

Location of Major Electric Utility/Dam Projects in Alberta

PART 9: AGRICULTURAL PROJECTS

FIGURE 9.0

ACTUAL AND PROJECTED TIMING OF NEW MAJOR AGRICULTURAL PROJECTS IN ALBERTA, 1989 - 1997(1)

Project (Location)	Est. Cost ($M)	1989	1990	1991	1992	1993	1994	1995	1996	1997
Canbra (Lethbridge)	10									
Cargill (High River)	44									

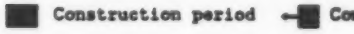


TABLE 9.0

PROJECTED CONSTRUCTION AND OPERATIONAL WORKFORCE REQUIREMENTS FOR NEW MAJOR AGRICULTURAL PROJECTS IN ALBERTA, 1989-1997

(Construction Workforce Requirements In Work Years)

Project	Est. Cost ($M)		1989	1990	1991	1992	1993	1994	1995	1996	1997
Canbra (Lethbridge)	10	CONS	0	0	15	5	0	0	0	0	0
		OPER	0	0	3	3	3	3	3	3	3
Cargill (High River)	44	CONS	100	0	0	0	0	0	0	0	0
		OPER	396	396	396	396	396	396	396	396	396
TOTAL AGRICULTURAL PROJECTS		CONS	100	0	15	5	0	0	0	0	0
		OPER	396	396	399	399	399	399	399	399	399

CONS - Construction
OPER - Operation

November 30, 1989

TABLE 9.1

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS FOR SPECIFIC AGRICULTURAL PROJECTS IN ALBERTA, (1)

PROJECT	Cembra	Cargill	Total Work Years
TRADE			
Boilermaker	0	10	10
Bricklayer	0	14	14
Carpenter	0	12	12
Cement Mason	1	9	10
Electrician	4	26	30
Insulator	1	8	9
Ironworker	1	20	21
Labourer	3	8	11
Millwright	3	26	29
Heavy Equipment Oper.	0	10	10
Other	0	2	2
Pipefitter	3	29	32
Sheet Metal	0	2	2
Supervisory/Support	2	8	10
Welder	2	16	18
Total Work Years	20	200	220

(1) Includes total estimated construction workforce to build each project. Cargill started construction in 1988.

TABLE 9.2

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS FOR SPECIFIC AGRICULTURAL PROJECTS IN ALBERTA, (2)

PROJECT	Cembra	Cargill	Total Ongoing Jobs
TRADE/OCCUPATION			
Acct./Purch.	0	2	2
Electrician	0	2	2
Engineer	0	8	8
Instrumentation	0	2	2
Management	0	25	25
Millwright	0	2	2
Heavy Equipment Oper.	0	2	2
Other	0	320	320
Other Trades	0	8	8
Pipefitter	0	1	1
Plant Operator (3)	3	0	3
Support Staff	0	20	20
Technical	0	2	2
Welder	0	2	2
Total Ongoing Jobs	3	396	399

(2) Includes total estimated operational staff to be hired for each project once construction is completed.
(3) Through in-house training.

TABLE 9.3

PROJECTED CONSTRUCTION WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR AGRICULTURAL PROJECTS IN ALBERTA, 1989-1997

Year/Trade	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Work Years
Boilermaker	5	0	0	0	0	0	0	0	0	5
Bricklayer	7	0	0	0	0	0	0	0	0	7
Carpenter	6	0	0	0	0	0	0	0	0	6
Cement Mason	5	0	1	0	0	0	0	0	0	6
Drilling	0	0	0	0	0	0	0	0	0	0
Electrician	12	0	3	1	0	0	0	0	0	16
Insulator	4	0	1	0	0	0	0	0	0	5
Ironworker	10	0	1	0	0	0	0	0	0	11
Labourer	4	0	2	1	0	0	0	0	0	7
Millwright	13	0	2	1	0	0	0	0	0	16
Heavy Equipment Oper.	5	0	0	0	0	0	0	0	0	5
Other	1	0	0	0	0	0	0	0	0	1
Pipefitter	14	0	3	0	0	0	0	0	0	17
Sheet Metal	2	0	0	0	0	0	0	0	0	2
Supervisory/Support	4	0	1	1	0	0	0	0	0	6
Welder	8	0	1	1	0	0	0	0	0	10
Total Work Years	100	0	15	5	0	0	0	0	0	120

TABLE 9.4

PROJECTED OPERATIONAL WORKFORCE REQUIREMENTS BY YEAR FOR NEW MAJOR AGRICULTURAL PROJECTS IN ALBERTA, 1989-1997

Year/ Trade/Occupation	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total Ongoing Jobs
Acct./Purch.	2	2	2	2	2	2	2	2	2	2
Electrician	2	2	2	2	2	2	2	2	2	2
Engineer	8	8	8	8	8	8	8	8	8	8
Instrumentation	2	2	2	2	2	2	2	2	2	2
Management	25	25	25	25	25	25	25	25	25	25
Millwright	2	2	2	2	2	2	2	2	2	2
Oilfield Related Occs.	0	0	0	0	0	0	0	0	0	0
Heavy Equipment Oper.	2	2	2	2	2	2	2	2	2	2
Other	320	320	320	320	320	320	320	320	320	320
Other Trades	8	8	8	8	8	8	8	8	8	8
Pipefitter	1	1	1	1	1	1	1	1	1	1
Plant Operator	0	0	3	3	3	3	3	3	3	3
Support Staff	20	20	20	20	20	20	20	20	20	20
Technical	2	2	2	2	2	2	2	2	2	2
Welder	2	2	2	2	2	2	2	2	2	2
Woodland	0	0	0	0	0	0	0	0	0	0
Total Ongoing Jobs	396	396	399	399	399	399	399	399	399	399

FIGURE 9.1

Location of Major Agricultural Projects in Alberta